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NAVASSA ISLAND-1974

...see page 16

The Radio Amateur's Journal

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AUGUST, 1976 VOL. 32, NO. 8

The Radio Amateur's Journal

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MODE: SSB, FM, CW, AM
RF OUTPUT: CW, FM: more than 10W output. AM: more than 3W output. SSB: more than 20W DC input.
ANTENNA IMPEDANCE: 50Ω (unbalanced)
CARRIER SUPPRESSION: Better than 40 dB
SIDE-BAND SUPPRESSION: Better than 40 dB
SPURIOUS RADIATION: Less than -60 db
MAX. FREQUENCY DEVIATION (FM): ±5 kHz
REPEATER FREQUENCY SHIFT WIDTH: 600 kHz
TONE BURST TIME: 0.5-1.0 sec.
MODULATION: Balanced modulation for SSB. Variable reactance frequency shift for FM. Low power modulation for AM.
MICROPHONE: Dynamic microphone, 500Ω
AUDIO FREQUENCY RESPONSE: 400-2600 Hz, within -9 db
RECEIVING SYSTEM: SSB, CW, AM: Single-superheterodyne. FM: Double-superheterodyne.
INTERMEDIATE FREQUENCY: SSB, CW, AM: 10.7 MHz. FM: 1st IF: . . . 10.7 MHz. 2nd IF: . . . 455 kHz.
RECEIVING SENSITIVITY: SSB, CW: S/N = 10 dB or better at 0.25μV. 20 dB noise quieting = Less than 0.4μV. AM: S/N = 10 dB or better at 1μV.
IMAGE RATIO: Better than 60 dB
IF REJECTION: Better than 60dB
PASS-BANDWIDTH: SSB, CW, AM: More than 2.4 kHz at -6 dB. FM: More than 12 kHz at -6 dB.
RECEIVER SELECTIVITY: SSB, CW, AM: Less than 4.8 kHz at -60 dB. FM: Less than 24 kHz at -60 dB.
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Zero Bias

DEPT. OF COMMERCE TO DISCONTINUE SHORT-TERM PROPAGATION FORECASTS ON WWV ON SEPT. 30th.

Henry Wheeler Shaw once said "As scarce as truth is, the supply has always been in excess of the demand." The plain truth is that amateur radio is being tested as never before. If we don't begin to rally in force over the incursions to our service than we can expect precious little at frequency conferences and NOTHING at all from our own government. With the CB avalanche moving on and on demanding and needing more and more frequencies, with a communicator class licensee in the offing who will also need more and more space it is imperative that the amateur radio operator of today stand up for his rights (and priveleges) and make his wants and needs known.

It Could Be Worse . . . . Maybe

Smile, cause you've just been ripped off in style by experts. There still may be time to alter the path of "progress" if you hurry but only if you're sure you want to get involved to hold onto something you had and took for granted and is now being taken away. If you're passive and believe in unbridled justice and natural fairness doctrines then hold out for your ultimate reward. Read on.

In March of 1975 we ran a survey for the National Bureau of Standards (NBS) to determine the pattern of use and users of the services provided by WWV/WWVH. This survey was conducted, tabulated and the results published as NBS Technical Note 674, "Report on 1975 Survey of Users of the Services Stations WWV/WWVH". (This report is available from the GPO, Superintendent of Documents, publication number SDC-13046:674, $1.50) This report is the results of the survey run in *CQ* and other journals and has significant impact on the value given to amateurs who took the time to fill them out.

The results of this survey in essence list the popularity or density of usuage of the various services of WWV and WWVH

(Continued on page 91)

8603 Conover Place
Alexandria, VA 22308
14 July 1976

Dr. Douglass Crombie
Director
ITS/OT
U.S. Department of Commerce
Boulder, CO 80302

Dear Dr. Crombie:

This letter is to request that the Institute for Telecommunication Sciences (ITS) continue to provide information on solar flux and geomagnetic activity through station WWV and the Weekly Radio Telecommunications Forecast.

At a time when decreasing solar activity makes communication by ionospheric propagation difficult, an increasing number of radio operators are using solar and geomagnetic data to prepare short-term propagation forecasts and long-term predictions. For example, Radio Amateurs have come to depend on the WWV broadcasts at 14 minutes after each hour for indications of current propagation conditions. Further, 27-day predictions prepared from data published in the Weekly Radio Telecommunications Forecast are employed by thousands of Amateur operators to plan more effectively their use of the high-frequency (HF) spectrum. Whether these operators prepare their own predictions or obtain them from the Amateur literature, the fact remains that the data on which the predictions are based derive from information supplied to the Public by ITS. As such, to discontinue the dissemination of solar and geomagnetic data at this time would negate those efforts which have, over the past three years, sought to educate operators in the science of ionospheric propagation, and in those methods which can be used to maximize use of the HF spectrum.

Understandably, the decision to discontinue issuance of solar and geomagnetic data is based on monetary considerations. However, because of the need for propagation information, and given the prestige in which station WWV is held worldwide by the scientific and radio communities, it is in the best interests of the United States to continue to provide data of the type broadcast at 14 minutes after each hour. That the time and frequency station of the Soviet Union has recently begun to broadcast similar information attests further to the growing need for these data.

Page 2
Dr. Douglass Crombie

With respect to the Weekly Radio Telecommunications Forecast, dissemination of this publication could be placed on a subscription basis. This would not only permit the ITS to offset postage and handling charges for this document, but would also open the way for the general Public to receive it (as opposed to the limited distribution which now exists).

Given the above as background, I respectfully request that ITS not discontinue the WWV broadcasts or the publication of the Weekly Radio Telecommunications Forecast. Your early consideration in this matter would be gratefully appreciated.

Thank you.

Sincerely yours,

Theodore J. Cohen, PhD
W4UMF

cc: The Hon. T.E. Wirth

Reduced version of letter sent by Dr. Ted Cohen, W4UMF to Dr. Crombie. Even though the type is small spend some time to read it.

Our Readers Say

FCC Actions - BOO!

Editor, *CQ:*

The FCC has just released Docket no. 20777, the latest step in the "deregulation" program. Let us examine the immediate effects the proposal would have on amateur operation in the lower frequency bands.

1- Conventional a.m., double sideband (reduced or suppressed carrier), and narrow band f.m. would be prohibited.

2- SSB and SSTV signals would be much more severely restricted in terms of permissable bandwidth than at present. Independent sideband simultaneous transmission of SSTV and voice signals would apparently be precluded.

3- Wide shift RTTY would be forbidden in the present c.w. bands, but wide and narrow shift forms of f.s.k. would be allowed in the "phone bands".

4- MCW (A2 emmission) would be legal on all frequencies in the h.f. bands.

The style of reasoning that went into this proposal reminds me of the "double think" which George Orwell describes in (1984), in which the government insists that "War is peace; ignorance is strength freedom is slavery". Now, outlawing a.m., DSB and NBFM and applying strict bandwidth limits to SSB and other modes is deregulation.

Our bands are not critically overloaded by present amateur usage. With the increase in popularity of VHF f.m., the h.f. phone bands have become significantly less crowded in recent years. Of course, we do not know what we will have as frequency allocations after 1979 But to-day, specified bandwidth limits are neither necessary nor desirable. It would work undue hardships on many amateurs to force them to abandon their present rigs. We should wait until after the W.A.R.C. to decide if we need rigid belt-tightening.

Donald Chester, K4KYV/1
Cambridge, MA

Editor, *CQ:*

In my 13 years as an Amateur Radio Operator I have never voiced my gripes in a major publication, but now the importance of the matter prompts me to say something.

Recently (?), I have given some individuals the code test necessary for the Novice. To date the written exams have not arrived which makes it almost five weeks. Other examinees have had to wait longer, and then longer for their licenses after they pass the written exam These people have worked hard and put forth effort to join the ranks of Amateur Radio.

I am requesting all the Amateur publications to generate a voice, petition or otherwise, to prompt the FCC to cure this ridiculous problem as soon as possible. Please represent these people; they deserve it.

Donald Collins. WB5QXJ
Houston, TX

FCC Actions - YEA!

Editor, *CQ:*

Just a few personal observations: First concerns the letter by W9YLD in April '76 *CQ*. If using Bicentenial call signs to celebrate our country's 200th birthday is juvenile I guess I'm back in my second childhood. I'm disappointed that more hams aren't interested enough to show the rest of the world that we're proud of two hundred years of America. Second concerns equipment reviews: I am all for reviews that are more up to date than we are used to. The article on the TR 22C is a case in point. I've been using mine for a year now and had to buy it blindly because I couldn't find any information on it. The info put out by manufacturers leaves me cold. Finally I'm enjoying the articles on the manufacturers and equipment of years gone by.

Sign me proudly "All American Seven November Echo Victoria"

Rod Hallen, AA7NEV
Tombstone, AZ

Editor, *CQ:*

With reference to the "Our Readers Say" on page 75 of the April issue of *CQ*, under the signature of one W9YLD.

I am an old timer too; 98CA back in 1922, and any time the FCC gives me the privilege of using a special prefix, without paying a fee, I am going to take advantage of it! Besides, I think we should broadcast our 200th Anniversary all over the world with these Bicentennial prefixes. It is to be regreted that more hams do not take advantage of these new prefixes, especially those who are chasing DX.

More power to the hams in the U.S.A. who are using the Bicentennial prefixes! Come on fellows, let's snow this guy under!

John G. Kuespert, AC9WCE
South Bend, IN

QSL 100%

Editor, *CQ:*

From time to time I have seen indication that you desire to receive reports about the service provided by those who advertise in your magazines. I would like to offer this, my report, of my recent business dealings with: 3-D QSL Co., Monson 8, Mass., 01057, a supplier and printer of QSL cards.

As a new general ticket holder, I was anxious to get new cards. On the evening of May 16 I was in Boston and mailed my order for QSL cards. The best estimates my fellow hams had was that I would get my cards within a month, if I was lucky. On Thursday May 20 I received an acknowledgement of my order from 3-D, and further stating that since I had paid an extra 50 cents for special handling, that the mails would not slow them down - so I should look for them soon. The next day, May 21, I received my QSL cards - AS I ORDERED THEM That was less than 5 complete days from posting my order.

Of course, since they got them out promptly they didn't have time to goof around, like misspelling my name or

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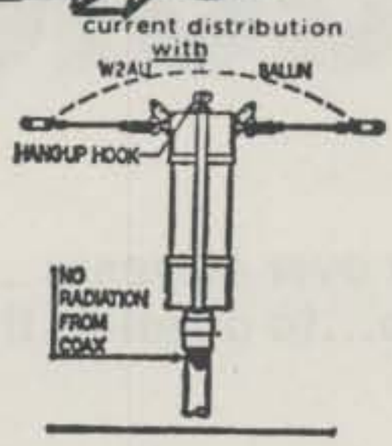

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getting my address or call incorrect.

In summary, I got what I paid for in what was probably record time for any QSL card company. I am satisfied with 3-D and felt you might want to know of their cooperation and competency.

Kenneth L. Dean, WA4APE
Stone Mountain, GA

It Really Works!

Editor, *CQ:*

In regard to the article on Audio Powered Noise Clipper (*CQ*, May '76, page 26). Having been interested in the audio type noise limiter for many years I built this one at once. For an outboard gadget, that does not require any receiver modification, it definitely deserves high praise. Spark interference from an elevator motor could be practically eliminated, when the control pot was advanced far enough.

These noise clippers are high impedance devices as I pointed out in my article (*73*, Aug. '65) on a much less effective diode clipper, and suitable input and output transformers are absolutely necessary. The sound quality (plus some insertion loss) was much improved when I replaced the skimpy Archer transformers with 6 volt filament transformers connected in reverse. The necessary box will have to be somewhat bigger, but for an outboard device, who cares.

I was unable to buy HEP 134 or 135 diodes, but found the type IN273 offered by mail from Poly Paks most satisfactory. These are listed in their catalog 216-A as signal diodes no. 92 CU2066 (40v. inv., 200 mils) at $1 - for 10 plus postage.

Paul G. Stecher
Westwood, N.J.

Novice News

Editor, *CQ:*

As a new member of the Ham ranks with an interest in journalism, I have decided to start a novice newsletter. After being discouraged by the lack of local aid and the lack of information available to novices, I decided that there is a definate need for a novice and prenovice Newsletter. I am sure that with my background a newsletter would be easy to produce. I have been everything from junior and senior high school newspaper editor, to yearbook editor and a contributor to several local newspapers.

Although I glean the various magazines for information, I am not at all sure that this is the case for most novices. For this reason I have decided to create a newsletter which will serve many purposes. It will allow novices to meet other Amateurs in their vicinity. The newsletter will feature operating and station hints, reader questions, equipment ideas, and the latest F.C.C. news. Finally I would like to establish a novice Net.

At this point my only problem is how to reach the right readership. That is why I am writing to you. In addition to the classified advertisement which I have taken in your magazine I am hoping that you could mention it elsewhere in your publication. If you can help to steer any novices my way it would be greatly appreciated. The Newsletter will be called: Novice Newsletter, 330 Euclid Avenue, Ambler, PA 19002. Sorry, I have no idea as to cost at this point. However, I can assure you that it will be operated on a non-profit basis. Until I see what kind of response I get, I cannot estimate printing and postage costs.

Aaron D. Bram
Ambler, PA

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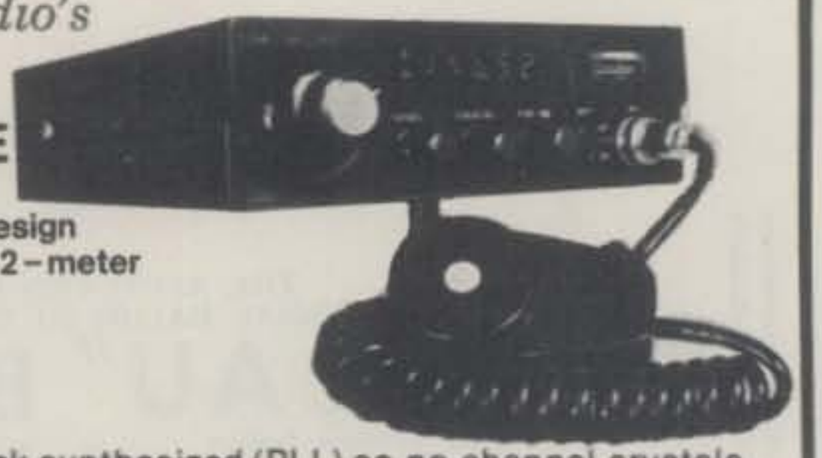

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Henry Radio's

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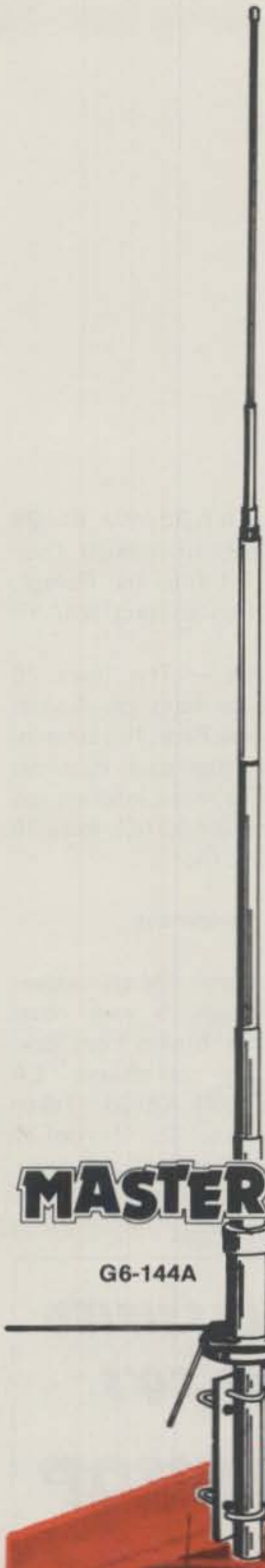

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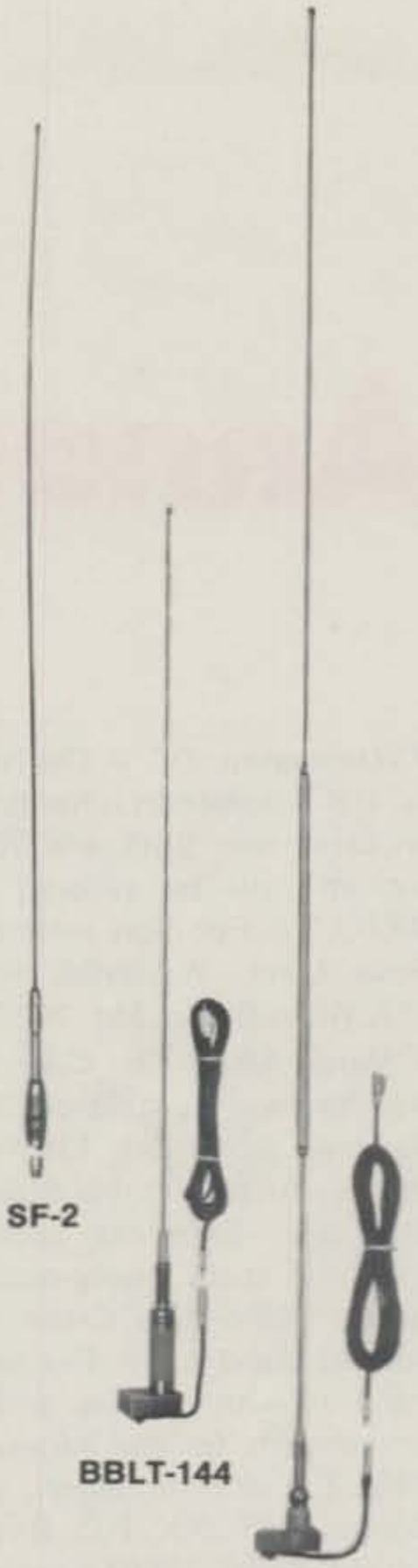

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Announcing

● **Washington, DC** — The National Capitol DX Association is holding DXPO '76 on September 25th and 26th. Program content will be tailored around the DXPO '74. For more information write: Rosie Lamb, WA3NGS, Route 1, Box 297, White Plains, Md. 20695.

● **Mena, AR** — The Queen Wilhelmina Hamfest will be held on Saturday and Sunday, September 11th and 12th at the Queen Wilhelmina State Park, Rich Mountain. Excellent accommodations and food at the newly restored historic Queen Wilhelmina Castle. Door prizes hourly, grand prize, flea market, camping area with utilities and rest rooms, amusements for the harmonics. Talk in 146.52. For information, write George Collier, WB5CXX, P.O. Box 5191, Texarkana, Texas 75501 or phone 214-838-0625.

● **Mount Clemens, MI** — The Fourth Annual L'Anse Creuse ARC Swap & Shop will be held on September 19th at the L'Anse Creuse High School. Doors will open from 0900 to 1500 EDST. First prize $200.00 cash. Talk-in on 146.52 and 146.94. Admission $1.50 at door, $1.00 in advance. For tickets send SASE and $1.00 to Robert Harder, WB8ILI, 51769 Base, New Baltimore, MI 48047.

● **Hamburg, N.Y.** — The Hamburg International Hamfest will be held on Sept. 18th at the Erie County Fairgrounds. Registration $3.00 at gate $2.50 in advance. Flea Market space $1.00 - $5.00. Friday evening Hospitality Get-Together with pre-registration drawing of a valuable prize, technical and organizational meetings, equipment displays, women's program, R/V and picnic facilities, fun, prizes. Talk-in freqs: 146.52, 7.255 (ECARS), and 3.925 mHz. Info: Bert Jones W2CUU, 143 Orchard Drive, Kenmore, N.Y. 14223.

● **New Berlin, IL** —The Sangamon Valley Radio Club Hamfest will be held on September 26th at the Sangamon County Fairgrounds. Food and programs, covered pavilion. Nearby camping. Talk-in 28/88 AF9AFA. Tickets $1.00. Write K9HDZ, 622 Magnolia, Rochester, IL.

● **Washington, DC** — The 1976 ARRL DX Technical Symposium will be held on Saturday September 25th. Previously unpublished papers are invited on technical subjects relating to long-distance communications. Areas of interest are: antennas, propagation, radio-frequency interference (RFI), station design for DX operation, DX applications of microprocessors and DXing via OSCAR satellites. Prospective contributors are asked to submit summaries by July 15. Manuscripts, photo of author and biographical sketch of amateur/electronic background are due by August 15. Write Paul Rinaldo, K4YKB, 1524 Springvale Ave., McLean, VA 22101, or call (703) 356-8918 eves.

● **Louisville, KY** — The Sixth Annual Greater Louisville Hamfest will be held on Sunday Sept. 26th at the Kentucky National Guard Armory in an indoor exhibitors area and outdoor flea market. Plus free ladies bingo and hourly ham door prizes. Admission $2.00 adults, 12 years and under free For more information contact: Denny Schnurr, K4GOU, 2415 Concord Drive, Louisville, KY 40217.

● **Malaga, N.J.** — The South Jersey Radio Assn. is holding their 28th annual hamfest: Sept. 12, 10 - 5 P.M., at Molia Farms. Lake, Picnic Grounds and food available. Tailgate sales, swap shop and door prizes. Family tickets: Advance Sales $2.50, Gate Sales $3.50. Advance sales send SASE to Jack Koch, Box 103, Cherry Hill, N.J. 08002.

● **Harrisburg, PA** — The Central Pennsylvania Repeater Association is holding a hamfest on Sunday, Sept. 19, at the Park-N-Shop Parking Garage, 200 Block Walnut Street. Gates open at 9:00 A.M. Registration: $3.00 per ham, XYL's free Talk-in on 146.16/.76 WR3ABV .94/.94 Food Available. Note: No Vehicle Over 7 Feet High Will Fit Into the Garage. For more information contact W3ABF or WA3AVX.

● **Marshalltown, IA** — The Iowa 75 meter picnic will be held on August 29th at the Riverview Park. Features include pot luck meal, ham auction, prizes and flea market. For more information write Mary Keener, WA0DAG, Iowa 75 meter, Marshalltown, IA.

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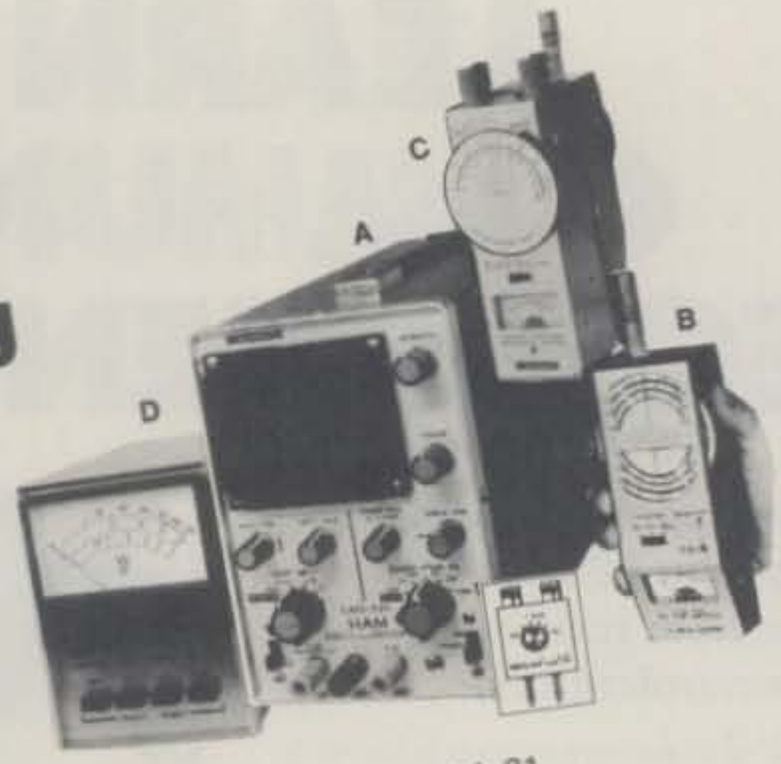

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The romance and fantasy of a DXpedition is sometimes just the tip of the iceberg. A lot of memories and stories reflect the unseen portion—the war stories, the adversities turned into victories and the fun of taking up the challenge.

KC4NI

NAVASSA ISLAND-1974

BY AMOR R. KLOTZBACH*, W2FYS

This is really a misplaced epilogue. In the latter part of November, 1974, six members of the South Jersey Radio Association (SJRA) planned and executed a DXpedition to Navassa Island. There are no famous DXers in the roster, just six average hams who set out to do something a bit different (for them). This is the account of their venture.

It all started back in July, 1974. A bunch of us were riding in W2ORA's VW bus, headed for the QTH of Tony, WB2MTU. The purpose for the trip was to set up a station at Tony's place for his special event station, WM2OON. This operation, now past history, was to commemorate the fifth anniversary of the moon walk on July 21, 1969.

As we rode, the conversation shifted through several subjects and finally came to rest on special event amateur operations. The imminent WM2OON operation was discussed. Since most of us present had been active with the WS2JRA activity sponsored by SJRA in 1970, a critique of this operation ensued. Unanamous agreement by all that such activities are fun, even if a fair amount of work was involved with the preparation, execution and clean up tasks associated with the operation. More small talk. The conversation lulled somewhat; probably each one of us was pensively reflecting back to high points of an individual nature.

Then the lightning struck. What's worse, we didn't even know what was happening at the time. Sy (W2GEY at the time but who has since become K2KA) casually stated that special event stations with unique calls were fun, but wouldn't it be something for once to be real, bona fide DX? Out of the country DX, with literally the entire world calling you? From some rare spot, such as Clipperton, Andorra, or Navassa?

To a man we were caught up in the fever of discussing such an experience. Except for some avid field day operations and special-event station activities, the only one of us with any actual DX operation experience was Joe, W2ORA, who had operated from St. Pierre in the summer of 1958 and still holds the call FP8AO.

Flipping to the practical side, someone noted that a Clipperton trip would more appropriately be attempted from W6-land, not New Jersey. Likewise, the logistics and expense of putting a station on from Andorra or some other European-area rarity also tended to discourage thoughts in that direction. The formalities of the red tape required to obtain permission to operate had not even gotten into the thinking cycle; we never made it over the financial brick wall.

The enthusiasm waned somewhat. For us to attempt a DXpedition seemed out of the question, financially, logistically, any way. But Sy went on, undaunted. "How about down south? What would it take to get to Navassa, or Serrana Bank, or some place else? Permission shouldn't be nearly the problem it would be if you were going to a foreign country. As for costs, well, we can check on that part, just to see what such a trip might cost."

The discussion came to an end rather abruptly—we had arrived at Tony's place and had the immediate chore of getting the WM2OON station and antennas perking. As we busied ourselves with the erection of a tower and 20 meter beam the DXpedition conversation slipped from

*1705 Lark Lane, Cherry Hill, N.J. 08003

The Navassa coastline is ringed by 50 to 100 foot cliffs such as these, all the way around. These cliffs are undercut too, which makes landing all the more difficult.

our memories. Weeell, not from *all* of our memories.

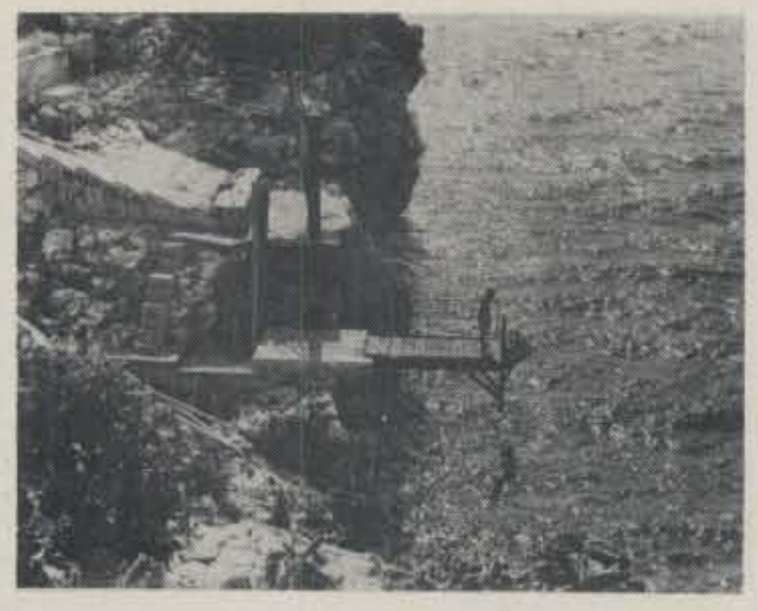
About two weeks later the bulldog tenacity of K2KA began to surface. Sy had begun a real research project into what it would take to go to Navassa. He had contacted the U. S. Coast Guard to request permission to land on the island: his efforts didn't stop there. He had begun a literature search and had come up with information on the 1958 KC4AF operation and the more recent 1969 K41A/KC4 trip. Sy made personal contact with Bob, W4QCW, who had written up the 1969 venture in *QST*. He had also contacted Lloyd, 6Y5LA, in Kingston to request some assistance at that end—namely with regard to a boat and customs. Wheels were beginning to turn. Even so, I was completely surprised when Sy plopped himself down next to me at work one day and casually asked, "how would you like to go to Navassa?" He continued with "I've been doing some checking around and it looks entirely possible." While I was still trying to absorb the initial salvo he hit me with; "so far I have firm commitments from Joe Duffin, W2ORA, Miles Brown, W2PAU, Frank, WB2BXV (Sy's son) and myself." Sy went on with "you would be number five and it looks like Bill Gallick, K2FT, may be the sixth. I figure six would be a good group size, don't you?" Well, what could I say? I told him I would think it over for a day and let him know. I knew in my heart I sure wanted to go along, but there was a serious family medical situation which also required careful consideration. Happily, these things were resolved; we reached the understanding that if the medical situation should take a turn for the worse I might have to bail out at the last minute. I signed up for the trip. As it turned out, this sign-up business was quite literal; we all had to sign waivers supplied by the Coast Guard stating we (or our survivors) would not sue the Government, should any misfortune befall us. Fortunately, nothing did, but I still keep a copy of the form to remind me how bad the DX fever can strike.

By this time Bill, K2FT, was also hooked, so the six-man Navassa team was established. Now to get down to the detailed planning. We knew *where* we wanted to go, the next logical question was *when?* More research revealed that chances of a hurricane in the Caribbean were slim after October, and that by November the rainy portion of the fall season in Jamaica was also pretty much over (ha!). Furthermore, five of us work for the same outfit and we get both Thanksgiving and the following Friday off as holidays. This was important for it reduced the number of vacation days we would need, and by this time of the year some of us had few days left. A check with Frank, WB2BXV, the sixth member of the group, indicated things looked good for him, too. He is a college senior and the Thanksgiving week presented no problems. More calendar checking verifed that the weekend before Turkey Day was the c.w. weekend of CQ's WW DX contest. For a brief while some thought was given to trying to be on the entire contest weekend. Unfortunately, when we considered the pre-expedition days required for last minute purchases; food, gas, lumber, etc., the contest weekend faded. However, we did hope to reach Navassa Sunday morning and get in 8 or 9 hours of contest operation. As you will see later, this did not materialize, through no fault of ours. Something about—"the best laid plans of mice and men—".

The Maty Sain at anchor off Navassa.

As I mentioned before, Sy had contacted Lloyd, 6Y5LA, and had requested that he assist us with some of the details requiring attention at the 6Y5 end. A regular schedule was established between New Jersey and Jamaica and for the ensuing months Lloyd did yeoman service for the 1974 Navassa crew. In all sincerity, I don't believe we could have done it without his help. He was tremendous, and a heck of a fine gentleman to boot.

Things were beginning to jell. As we plunged deeper into fall the required arrangements were completed, one by one. We had a boat chartered, our airline tickets were ordered, and we had been able to contact the Jamaican Boy Scouts to borrow some tents, cots, and folding chairs. Obtaining these items locally in Kingston saved appreciably on the shipping charges. The FCC had been contacted and we had been granted the call KC4NI for the operation; the



Landing at Lulu Bay Navassa—the only access to the island.

"NI" suffix for Navassa Island, natch!

As the first of November rolled around we were down to the final preparation and last minute decisions and revisions. The one major change in our plans was with respect to how the rigs were to be transported. The original plan called for transporting the station equipment as personal baggage; nine items (3 TX, 3 RX, 3 PS) spread out over six people. Even though the modern gear is quite light, 15 to 20 pounds per item cut deeply into the 44-pound-per-man weight allocation. Even worse, three of us would have to carry the power supplies too, and these averaged 25 pounds or so. Obviously those with the power supplies were wiped out of the 44 pound allotment right off the bat. We thought of dividing up clothing among the others or other schemes to keep the weight down but nothing seemed too satisfactory. Considering the fact that excess passenger baggage cost about $1.20/pound, (one way) whereas air freight cost about 0.70/pound round trip, we finally decided to ship the whole mess of station gear and travel like gentlemen. Incidentally, this worked out fine; the gear was transported to and from in fine style with no mishaps whatsoever.

Things were just about set. We had a meeting the first week in November (5th) to decide when and how the

Cactus on Nevassa — "Plentiful and Nasty".

The terrain on Nevassa was something less than optimum for walking around. No wonder the USCG put in the concrete walkway we nicknamed "Main Street of Nevassa"—it would have been a real thrill getting the acetelyne gas cylinders (for the early light) up from the landing area without it!

gear was to get to the airport. The schedule was established at this time—the gear would be packed by the weekend of 11/16—delivered to W2PAU's QTH on Sunday the 17th and transported to the air freight terminal in Philadelphia on Monday in Brownie's VW bus. This was done, to make a long story short, and after paying the forwarding agent $340, the load was booked on a flight to Kingston on Tuesday, November 19th. Once this was done it really hit home—we're going. This was especially true at the home shacks of K2FT, W2FYS, and W2PAU, which now had somewhat of an air of nakedness with the absence of some of the prime station equipment.

Thursday morning, November 21st, the advanced guad, comprising Sy, Miles, Joe, and Bill, departed Philadelphia airport bound for Kingston, Jamaica. Their task was to make the necessary purchases of items to be procured in Jamaica; food, gasoline, lumber, etc., plus the round-up of the borrowed camping equipment from the local Boy Scout organization.

We shipped over 1000 pounds of gear and supplies from Philadelphia, and picked up food, gas, water, lumber plus the borrowed Boy Scout equipment in Kingston. It all made the trip up the ladder, just like we did (whew!).

Things were pretty well under control by the time Frank and I arrived on the scene in Kingston on Saturday, November 23rd. Things were in the process of being loaded on the *Maty Sain,* the 65-foot single diesel fishing work boat we had chartered from Spenco Fisheries. A few of the last minute arrangements traditionally associated with ventures such as this were completed and, before we knew it, the departure time had arrived. At 9 p.m. EST we were underway. It took some time just to clear the Kingston harbor—it is the seventh largest in the world and we were well-removed from the open-sea end. So far so good. Even Bill, K2FT, was doing fine and he had predicted that he would be seasick the moment he knew the last line had been cast off. The *Maty Sain* headed for the open sea. The group was in good spirits, contemplating the arrival on Navassa sometime the following morning. A couple of the fellows were chatting with members of the crew, others were discussing various subjects among themselves. W2PAU and W2FYS were enjoying the ride flaked out on the deck in the bow of the ship. Things were just peachy.

Some time later the snoozers in the bow were rudely awakened by water breaking over the bow and splashing them. Undaunted, the pair retreated off to a spot more sheltered from the flying spray. A couple of the fellows had gone inside, to try to get some sleep in the bunks in the tiny cabin located just behind the bridge. Most chose to stick it out on deck behind the cabin structure where it was somewhat sheltered from the spray. The ride was beginning to get a bit rough but not uncomfortably so. Little did we know that this was but a mild preview of things to come.

As the boat plowed on, the last glimpses of light from the Jamaican mainland slowly disappeared into the night. What had started out to be a nice evening at sea was rapidly deteriorating; the sea was getting very rough and ugly dark clouds now obscured what moonlight we had at the time of departure. The boat was rolling and pitching quite badly by now, and those of us still on deck were hard-pressed to stay in one spot, even though we were all hanging on with a vengeance. Water was coming at us from all sides now, driven by a wild wind. We were sheltered from the direct rain by an overhead tarpaulin-type awning, but there was so much water being blown in from the sides that we were all soaked anyway. About this time, one of the crew members gingerly made his way back to us to state that the captain wanted everyone inside the cabin, to preclude losing anyone over the side. Bolstered by those words of encouragement we single-filed forward to the cabin entrance and stumbled in. Even floor space was at a premium in the tiny enclosure, but we all managed to sit down somewhere. Wow-Hot and smelly—plus. Some of the troops had all ready succumbed to the storm and had taken on varying shades of green. Before long, the late comers were also getting into the act, prompted no doubt by the combination of sea sick odors and the accentuated pitching to which the more-forward location was subjected. One consolation, if you can call it that, was that we were not alone. As the captain called the names of successive watchstanders to take the wheel he was answered with moans, groans, gurgling noises, or nothing at all. The entire crew was seasick. This was undoubtedly the clincher. Faced with the reality of manning the wheel himself for another seven or eight hours, the captain decided to allow discretion to triumph over valor; we headed back toward Jamaica.

The *Maty Sain* nosed into the refuge of Port Morant on the eastern coast of Jamaica just as the first rays of daylight were creeping across the water. For the next six and a half hours we cleaned up, rested and relocated some of the more soaked packing boxes to more sheltered areas. Some of the more hardy souls even took on a little nourishment. Then, somewhat fortified by the rest, we again headed for Navassa. The storm had subsided considerably by this time but was still in progress. We sighted the Navassa light about 8:30 p.m. and finally reached the island at 11 p.m. A weary crew dropped the anchor and we all tried to get what rest we could. This didn't come easy, even as tired as we were. The captain kept the engine idling all night, just in case the anchor didn't hold. We were about a quarter mile off shore and bobbing about in heavy swells. Have you ever tried to sleep while your body is slid across the deck of a boat, from one side to another? And this was one of the choice locations! The tiny cabin was warm, smelly, and crowded far beyond normal capacity. Personally, I'd take the deck any day, even with the periodic toboggan ride.

I was awakened in the gray of predawn by the noise of the anchor being hauled in. Soon the engines changed their tune and we were underway, cruising parallel to the shore and looking for the landing. Lula Bay is a real misnomer. The "bay" is actually a very slight in-

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dentation in the face of the high vertical cliff wall which rings the island. Part way up the cliff a catwalk has been secured to serve as a landing point. From this cantilevered vantage point a stainless steel wire rope ladder has been suspended to where it just reaches the sea, about 35 feet below. This is the only access point to the island, unless you're lucky enough to be in a helicopter and can land on top of the island. We weren't.

Spotting the landing area from the boat was not easy. Understandably, the captain wanted to remain a reasonable distance off shore while he looked, just to play safe. In the early morning light the shadows cast by the rocks did a good job of obscuring the land marks. Only after close scrutiny with binoculars were we finally able to identify the landing ladder and walkway. The anchor was dropped and our moment of truth was rapidly approaching. As the light level increased and we could see the Lula Bay area more clearly, we received another surprise. Who said Navassa was uninhabited? By now we could make out two small (about 18 ft.) boats that were tied to the ladder. As we stared toward the landing area, figures appeared on the catwalk. A few descended the ladder and got into one of the two boats. They cast off the tether line and headed our way. Not knowing what to expect we were somewhat relieved to learn that the temporary occupants of Navassa were Haitian fishermen. There were ten in all, who had traversed at least 30 miles of open ocean in the two small boats. Conversation was impossible; communication was not much better, because the Haitians spoke no English. A few of us tried our hand at high-school French with little success; right basic language, but evidently the wrong dialect. We finally resorted to sign language and gestures, with a word or two in French thrown in from time to time.

A long rope was strung from the *Maty Sain* to the landing ladder. This was subsequently used as a hand line, to pull the small boat from the ship to the landing. The storm was gone but the water was still quite choppy. Rather than chance losing or ruining any of the precious radio gear, we decided on the small-load, many-trip approach. The first load comprised the makings of one complete station; 60-pound motor-generator unit, rig, receiver, vertical antenna, plus miscellaneous items. Sy, K2KA, and Miles, W2PAU, accompanied the first load to the landing area. The gear was hauled up to the catwalk and shortly thereafter a makeshift station was on the air. The first order of business was to get word back to the home front that we had arrived safely. We figured that our families were beginning to become concerned since we were already about a day late in airing a station. This was a case of no news definitely not being good news.

Well, things went smoothly. The first contact from Navassa was with a New York amateur who phoned Sy's wife in Haddonfield, N.J. All of us live within about ten miles of each other and we had previously listed all telephone numbers at each household. The plan was that the first XYL

One of the younger members of the Navassa "Old Goats".

W2PAU and W2ORA tackling the job of putting up the beam, supervised by two unidentified bosses.

who received word would relay to the others. It worked fine. By about 10:30 all the families had been notified that all was well. This done, W2PAU and K2KA continued to operate while more of the gear and operators came ashore. Bill, K2FT, was third to arrive, followed in the next trip by Frank, WB2BXV. Joe, W2ORA, and your writer stayed on the *Maty Sain* to supervise the off-loading arrangements and order of disbursement of the remaining items. Several more trips were made to get all the essential stuff to the island. Joe and I had our hands full trying to transfer things from the *Maty Sain* to the small boat bobbing alongside. Though the day promised to be sunny and clear, the sea was still running rather heavy. Equipment transfer was tricky, so much so that we decided to leave the third generator on the *Maty Sain*. This unit weighed 160 pounds and we had had enough trouble with the two others, at 60 and 90 pounds. Besides, we rationalized, the 90-pound unit was rated at 1750 watts, which should be enough to handle two stations. Joe and I piled in with the ninth boat load and, shortly thereafter, joined the others on the Island.

The Haitians were very helpful. They carried most of the gear from

W2ORA operating from Station 1, as viewed from "Main Street of Nevassa." That's the Maty Sain at anchor in the upper right.

the landing to the area we had decided to call home for the next few days. This physical assistance was a real life-saver to us, for by now the heat was beginning to make its presence known. This, coupled with the exhausting trip to the island was causing us to feel a bit pooped, especially the "older" fellows. (I can say this for, at 44, I was the second youngest member of the group.)

In return for the portage assistance, we collectively contributed various articles of clothing to the Haitians. They were most appreciative; what meager items of clothing they already had were much the worse for wear.

Station No. 1, the station that had been hastily assembled to make the first contact was shut down at this time. Everyone pitched in to get things set up and by late afternoon we had most of the gear and antennas ready to go. The tri-band beam was still to be erected, as was the

W2FYS giving a whirl on c.w. from Station 2.

160 meter dipole, but the operating positions had been fashioned from the cartons plus some of the lumber we had purchased in Kingston. We also had three tents pitched (one was the supply/kitchen tent) and the lone station not afforded some shelter was—you guessed it—the one originally assembled for the first contacts. It had been moved back about 50 feet from the cliff edge to the concrete base platform of one of the old winch mechanisms, long-since rusted and useless.

The remaining daylight hours of Monday were spent on a split-effort basis. While operators manned the two stations that were functioning, others busied themselves with housekeeping. We were trying to establish some order with the pile of support equipment that had accumulated in a disorganized heap near the supply tent. My poking produced a stove, cooking utensils, and other sundry kitchen items from the chaos. However, as I casually rooted through the food supply I made an agonizing discovery; no coffee, no tea, no sugar, no canned milk. Who ever heard of an extended amateur operation with no coffee? Ridiculous! Things got even worse after an extensive inventory was concluded. All of the "goodie" items were missing: peanut butter, jelly, canned fruits, canned tuna fish, canned meats. As W2PAU so aptly put it at the time; "All the things I really cared about." What was left was a not-too-thrilling array of canned vegetables, soups, a few prized cans of spaghetti and meatballs, some dry cereal, plus (fortunately) a reasonable quantity of canned orange juice and tomato juice.

Allow me to digress for a moment to explain the food situation. Evidently, somewhere between the grocery store and the boat a cart full of goodies got sidetracked, much to the dismay of all. However, we made do with what we had; there was more than ample quantity available, even though the dietary balance was significantly less than ideal. The canned juices were particularly popular. Most of the time none of us felt too much like eating (except K2FT, the smallest member of the group, who ate constantly) but a cup of juice with a piece of ice from the cold storage area of the *Maty Sain* did hit the spot. As a result of the general disinterest in meals (excluding K2FT), most of us lost about 15 pounds during the week (K2FT lost only 5). A daily trip was made to the *Maty Sain* to get water, gasoline, and the ever-popular ice.

Getting back to Monday night, once we had nibbled what food we desired we took turns manning two stations for the remaining waking hours. Station 1, near the cliff edge consisted of W2PAU's R-4A/T-4X equipment and had access to paralleled dipoles; 80/40 and 20/10. In the final analysis, this station carried the load on 20 s.s.b. (nearly 1900 QSO's). The 20 meter dipole located close to the sea did about as well toward the states as the beam (located further back).

Station 2 was located about 75 feet further back from the first. It, too, was an R-4A/T-4X combination (W2FYS's). This was the catch-all station; whatever antenna was available was used here. The 80/40 dipole has a feed line long enough to reach this point, as did the trap vertical. This was the 160 meter station, exclusively. Most of the 40 meter s.s.b. schedules with 6Y5LA were kept using this gear, but the major emphasis was 15 meters.

Back about 50 feet more, Bill had nestled his 75S1/32S1 combination

(Station 3) in among the trees. The beam and vertical were both available to this station, which ended up as the c.w. workhorse, primarily on 20 and 40. Both the beam and vertical were used to make about 1200 20 meter c.w. contacts. On 40 c.w. this station used the vertical exclusively and made nearly 1000 contacts!

As conditions changed and 20 began to fade, Station 1 switched to 40 c.w. using the dipole. Station 2 was not manned at this time because of the lack of a suitable antenna; also, the 160 meter dipole was not up yet. Station 3 had been banging away on 20 c.w., using the vertical (beam not up yet). As the bands shifted some more, this station switched to 40 c.w. and the first station went to 80 c.w. on the dipole.

The rough trip over, plus the lack of any appreciable sleep for two days began to take its toll as the evening progressed. One by one the bystanders flaked out for much-needed rest. Station 3 was shut down about 0600Z because the activity on 40 c.w. had petered out. Diehard K2KA plugged away on 80 c.w. for a while longer and then he, too, gave up for the night and shut off the generator powering Station 1. I imagine the Haitians appreciated the restoration of peace and quiet to the island, but the exhausted KC4NI crew was too far gone to care—Sleep at last!

At dawn, when the early birds began to stir, the first order of business was to fire up the generators. The first night on Navassa had passed rather quietly. Although much too short, the rest did all of us a world of good and things were looking brighter. The bands were beginning to come alive, too; evidently the word was being passed that KC4NI was indeed on the air. While a couple of operators manned the bands that were usable, the others took a crack at breakfast. By now even those who were the most sea sick during the storm were beginning to take an interest in food. The rock had steadied considerably and their stomachs were growling for something to replace that lost on the boat trip. Even the nondescript offerings that masqueraded as breakfast were welcomed at this point. Eating was accomplished in shifts and eventually all were fed, to some degree or another. We changed operators and set about to erect the remaining antennas, primarily the tri-band beam. W2PAU and W2ORA tackled this chore while W2FYS climbed up the hill to find a place to fasten the up-hill end of the 160 meter dipole.

Joe, W2ORA, had an interesting experience during the beam assembly task. He noticed one of the Haitians carefully peeling a piece of masking tape from the beam shipping carton. Curious, Joe watched to see what the man was going to do with the tape. He soon found out—the Haitian wrapped it around a rather ugly gash on his left leg. Quite simply, he was using it as a bandage. Joe called to the man and, with a ridiculous combination of gestures and grunts, conveyed the idea that he would bandage the wound. The first aid kit was produced and Joe set about his task. As Joe related afterward, "I carefully read the label on the antiseptic I used—three times—just to be sure it wouldn't sting. I didn't want him to get the idea I was trying to hurt him!" When he finished with the gauze pad and adhesive tape, Joe was conscious of a commotion behind him. He turned and found four more Haitians making unintelligible noises and pointing to similar scrapes and wounds! "Dr. Joe" repeated his services for the new sick call arrivals. As he concluded, he was greeted with smiles and a "merci." A minor thing, but we all felt that this offer of assistance on our part helped maintain a friendly coexistence while we were together on the island.

W2ORA doin' his thing on s.s.b. from Station 3.

Tuesday progressed at a rather low-key pace. We were all significantly affected by the lack of sleep and the hectic boat ride, and the heat wasn't helping us too much, either. To be uprooted from an environment of freezing weather just a few days before, and then exposed to approximately 90-degree heat was rough on our systems. None the less, by mid afternoon we had all of the antennas erected.

Darkness began to close in on us once more. After another wonderful (?) meal (I have to defend myself because I was the cook!) we were all feeling just about normal once more. Even Joe was feeling better now. He had been fighting a flu-bug just before he left and that, plus the boat ride had put him through the wringer. The tempo of operations was picking up also; we had some real hefty pile ups, especially on 20 meter s.s.b. Our original goal of 10,000 QSO's had faded when we arrived one day late. We had lost out on the Sunday operation which meant the loss of the *CQ* WW DX Contest activity coincidental with this particular weekend. We had planned to get in about 9 hours of hot c.w. activity during the latter part of the contest. What a way to start a DXpedition! Unfortunately the storm also scuttled this little bonus.

"Doctor Joe", W2ORA, does his thing... bandaging a Haitian fisherman's leg.

By this stage of the game we had verified what we had been told by the 1969 DXpedition to Navassa.... Europe was rough. Our antennas were on the wrong side of the hill to do an effective job. Apologies to those who tried to get through from Europe and didn't make it. If we ever go again (it's possible) we would consider packing a station to the top of the island.

At about 0200Z we took a look on 160, just to see what was cooking. Things looked pretty good, so Station 2 was tuned up and cranked out QSO's for the next three hours. During this time, Herb, KV4FZ, called in after he got home from the local salt mine. After a c.w. contact we switched to s.s.b. and KV4FZ notched the first 160 s.s.b. QSO with KC4NI.

K2FT and WB2BXV hard at work from Station 3, the c.w. workhorse position.

W2FYS preparing another wonderful (?) gourmet's delight for the KC4NI gang.

During an earlier contact on 20, Herb had inquired about 160 and was hoping we would still be on when he got home at 11 pm local time. At that time I assured him that we would look for him — no problem. As he closed he made the comment which was to become the watchword of the expedition—"watch that cactus!"

The cactus on Navassa is worthy of special note. I can sum it up here with two words; plentiful and nasty! The cactus plants ranged in size, from chest-high growths down to tiny critters that could be well hidden by the other ground foliage. The big ones were very formidable, but fortunately, they were reasonably easy to avoid. Even so, we were all amazed how easily the end ball of the big plants would become dislodged. If you so much as made a breeze when passing close by, it would usually get you somewhere. The little plants were generally more troublesome though, because of their ease of concealment. Having been a member of the 1969 DXpedition to Navassa, Herb knew what he was talking about. As they say on the Tonight Show—"How bad was it?" Well, it was so bad that all of us carried scars for quite a while after we returned home. Some were more delicate than others. Brownie decided to go native after a couple of days and was barefoot when he stepped on a sneaky little cactus ball that had dropped in the otherwise cactus-free camp area. His first reaction was to kick out; big mistake. Somehow it didn't stay with him the first time, but the kick brought things together nicely. This is how we learned that needle-nosed pliers worked well for removing the spines. Joe had a particularly thrilling experience. As he crouched down to remove a cactus ball from his shoe he picked up another one—further back. He had a welt you wouldn't believe in a place which shall remain nameless. Sy was troubled with a sore foot while on a business trip two days after his return home. He went to a local hospital in Albuquerque for treatment. The doctor lanced his foot and removed — you guessed it — a cactus barb.

Bill, K2FT, was the one constantly being accused of eating all the time, so he took this picture of W2ORA just in self defense!

Brownie's Drake gear at Station 1 milked 20 until it folded and then switched to cover 80 or 40, s.s.b./c.w., depending upon what Bill's S-line was working at Station 3. My R4/T4 combo at Station 2 gave 160 a go, with a final fling at 80 c.w. before I hit the sack at about 3 a.m. The alarm went off two hours later and I got on 160 again to look for W2QHH on schedule. Howie was worked, as were a few more before we again changed bands. Meanwhile, Bill and Frank had been giving the boys Navassa on 40 c.w., but as 20 opened they switched to that band and forged on into Wednesday.

K2KA, the bona fide PhD in the group, using his head . . . only this time as a tent pole!

As we were relieved from operating we each took time to do a little exploring around the island. Most of us hiked up to the lighthouse, just to see it (we couldn't see either the structure or the light from our location on the first plateau of the island). It was worth the walk; a most impressive structure, especially when you remember that it was built nearly 60 years ago. Other than the construction and size, the most impressive item to me was the group of batteries located in the base. That's right, batteries! Navassa light is powered by storage batteries. It gives you the feeling that you are looking at the Jolly Green Giant's flashlight!

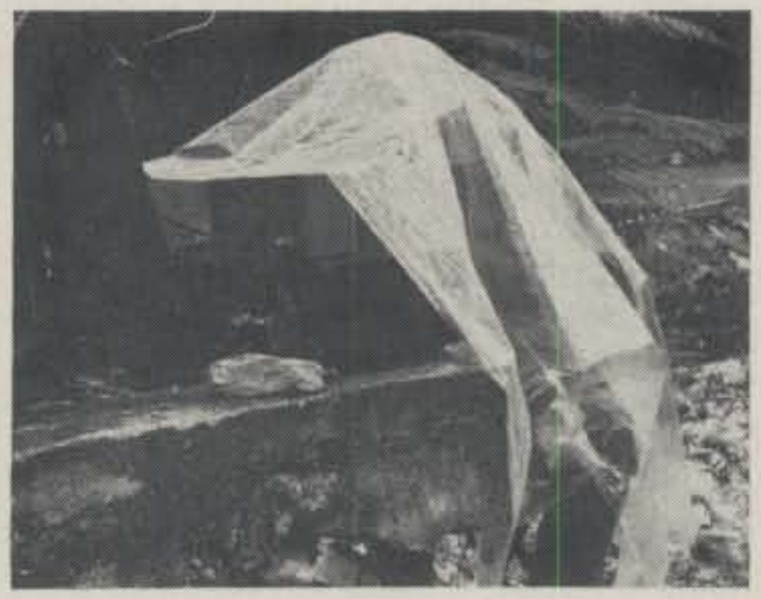
While we were on the top of the island we dipped some water out of the cistern located in the lightkeeper's house. There must have been several thousand gallons in the thing —it was nearly full. We didn't drink any, although it did look pretty good. We did have ample water, even if the food situation wasn't the greatest. We dipped some water out and stripped down for a sponge bath. It was great! Up until now our busy schedule had excluded the niceties of civilized man, but the clean-up reminded us how good it felt to be clean and refreshed again.

The rest of the daylight hours of Wednesday went pretty much as before. One notable highlight was a fairly good opening on 10 meters, the first since we had been on the island. For about three hours in the early afternoon the band, though suffering from violent, rapid fading, did hang in long enough for over 200 contacts. Then, it was over, and the more routine operating schedule was again established as the daytime bands began to wash out. Guess that was a Freudian slip of sorts, because I know what's coming next! Anyway, things moved along smoothly for the next several hours. Sy was on 75 at Station 1, I was on 160 at Station 2, and Bill was on 40 c.w. at Station 3. Along about midnight it began to rain, as it had a habit of doing from time to time. There was no lightning, so undaunted, we kept going. Bill and I had adequate cover, only Sy was unprotected at the forward site (Station 1). However, he quickly grabbed the plastic drop cloth we had left there for just such an emergency and spread it over the whole mess. Using his head as the top support for his newly formed tent, Sy was able to protect the gear and keep going. Unfortunately, Murphy was lurking—ready to exercise his infamous law. As luck (bad) would have it, the tarp shifted slightly and a crease was formed at the rear. This crease neatly funneled the tarp run-off down into the back of the T-4X until — boom! The transmitter died in a blaze of glory—a big yellow one, at that. The rain was really coming down now, sufficiently so to drown out the two MG sets, effectively shutting down the other two stations. Happy Thanksgiving! What a way to start a holiday. We tried to get the generators going, but the wires were soaked by now. Even the

spray can of water chaser didn't do much good. Nuts. The generators and gear were covered and we all holed up to wait out the rain. Most of the showers we had experienced to date were of brief duration—usually only a few minutes. Naturally, this one was different — it poured for nearly two hours.

Eventually it did stop raining. Brownie, the master mechanic, got the generators running and two stations were again available. Frank relieved Bill on 40 c.w. Things were quiet with what I had to work with, so I went down to hold the flashlight for Brownie's troubleshooting venture. He literally poured water out of the Drake as he tipped the back end down. What a discouraging sight. About that point in time it looked as though KC4NI would be down to a two-rig operation for the remainder of our stay on the island. Undaunted, Brownie dug in and soon had the unit, sans cover, on its back at the operating position. After a few um hums, he announced that things didn't look too bad. It looked like a burned up resistor in the driver stage might be the problem. A close substitution was obtained from our spare parts complement. Fortunately, we were pretty well prepared with a variety of resistors, capacitors, tubes, etc., plus the all-important instruction books. A multimeter and small soldering iron rounded out the repair capability. The resistor was installed but the rig still didn't work. Initial optimism faded somewhat at this set back. Brownie renewed his circuit-checking effort with new determination. Some time later he located part two of the problem; another burned up resistor, this one in the power supply. A replacement resistor was installed in the supply and the cables were reconnected. Success! When energized, the rig gave all the familiar indications as though nothing had happened. We were back in business again with three transmitters. Not that we needed them—at 4 a.m. the activity was not too hectic! There was more local activity than that which we found on the amateurs bands. The ten Haitians who had been on the island since we arrived had evidently decided it was time to head home. They filed down past Brownie's station and began to make preparations to get underway. This took a little time. The Haitians had taken about seven or eight goats with them, and finding room for the ten people, plus the goats, in their two tiny boats must have been something of a challenge. We had mixed emotions about them taking the goats but had neither the language skill to tell them not to, nor the muscle to back it up. Amid a few "bon chances" and "au revoirs" they left, heading for the nearest point of Haiti which was about 30 miles to the east. We now had the island all to ourselves, a condition we fully expected to encounter on our arrival, three days earlier.

By this time I was back on 80 c.w. and Frank was on 40, so Brownie took a well-earned breather. Clad only in his rain-soaked white skivvies he retreated to his equally rain-soaked cot and promptly went to sleep. His sack-time was relatively short-lived. Soon the first rays of morning sunlight were bathing our tiny encampment. The only signs of last night's bout with the elements were the clothes laid out where the sun could dry them. It was warm already; turkey day on Navassa had all the makings of becoming a real scorcher. We went through our usual routine of changing operators and eating some breakfast of sorts. By



H_2O and T-4X don't mix! A situation similar to this probably generated the midnight fireworks.

now the variety of canned goods had shrunk to a large quantity of vegetables, a rather uninteresting array of soups, a rapidly dwindling supply of tomato juice (we finished the last of the orange juice the day before) and two cans of spaghetti—with meatballs, if you please! The spaghetti was being saved for the biggie—Thanksgiving dinner. As it turned out, the thought of another vegetable/soup combination lunch was just too much. We ended up having the spaghetti at noon instead of for the evening meal, as originally planned. The soup and vegetables route was sort of like roast elephant—tasted lousy, but very filling!

KC4NI was kept humming all day. The holiday gave a lot of U.S. amateurs the opportunity to work us, and we tried to band hop enough to give those interested in 5BDXCC a very good shot at Navassa. At Station 3, Bill and Frank were again concentrating on the c.w. effort; 20 and 40

This was home for W2FYS's R-4/T-4 while on the island.

were very productive with a brief fling on 15. Again, in the early afternoon, 10 meters obliged and provided another opening for nearly four hours. This allowed the boys to give the fingers a breather and they talked their way for another 250 contacts on 28 MHz s.s.b. But, as always, good things come to an end.

Ten meters eventually became unusable once more and the station was switched over to 20 s.s.b. because Brownie's rig was on 20 c.w. At one point it looked as though ten was going to reopen; a few stations were indeed worked, but the band closed down abruptly and stayed that way. While all this was going on, I was trying to get something going on 15 c.w. A few fruitless CQ's were not too encouraging. Finally a taker; then another. The magic of a KC4 call was beginning to do its stuff! It's amazing what a barefoot rig to a trapped vertical can do when you have the right call. One interesting point of this operating stint was the contact with the Wallis Island DXpedition. In short order QSO's were notched with FW0's IC, GA, and DX. It isn't often that you work *three* Wallis Island stations within six minutes. (Personally, I'd settle for just one for W2FYS — I still need FW!)

Shortly after 2200 Z 15 took a nosedive. Twenty was well represented on both c.w. and s.s.b.; 10 was dead and 40 was rather unset-

W2PAU, a displaced v.h.f.er at heart, in deep concentration on another pile-up.

Frank, WB2BXV, was always eager to hop in on a c.w. band—don't think he ever picked up a mike.

tled. With nothing to operate, I went over to the supply tent to see what could be done about food. About this time the six of us were thoroughly bored with meals. We really didn't eat that much, as the weight loss we all experienced will attest. Still, we went through the motions. I routed through the remaining stuff, secretly hoping that by some magic a few more interesting items would be uncovered; they weren't. As I pondered the monumental decision of which array of cans to open, Joe came over with great news. Our Jamaican crew members had prepared a fish dinner for us. What a surprise! Meal enthusiasm rose about 200 percent. Joe and I grabbed plates and utensils and headed for the chow. We came in a poor place and show. Bill was already there, loading up! That guy had an uncanny nose for food; nothing escaped him. As Joe and I got to the goodies we noted that the meal consisted of fish, a cooked banana-like substance (plantain), and something which closely resembled white hockey pucks. These, we learned, were "dumplings". The dumplings even tasted like hockey pucks (very firm), but at this stage we were not going to look a gift hockey puck in the mouth, so to speak. We ate just about all of everything. When everyone had finished eating, the consensus was that, on a scale of 1 to 10, this meal rated about a 9.9 over the canned-vegetable-sans-meat fare we had anticipated. The fish, in particular, was delicious. I don't know what kind it was, but it sure hit the spot. This surprise meal did wonders to bolster everyone's enthusiasm for the relatively few remaining hours we had left on Navassa.

K2KA slightly indisposed. Those pile-ups can be murder!

Once more darkness began to take over the island. The relatively sheltered areas of the operating positions and the supply tent were always first to be obscured so we tried to minimize movement after dark. Walking around was always tricky, but after dark it got downright dangerous in spots, even with a flashlight. Fortunately we could use the concrete sidewalk we had dubbed "Main Street Navassa" to get to Station 1. This walkway was evidently installed to facilitate carrying the acetelyne gas tanks up from the landing area to the small building where they were stored. From this point the gas was piped up the hill to the light. Portions of the tubing and the concrete raceway which protected it are still present today. We made good use of the various concrete structures situated in our midst. One generator was on the sidewalk (Main Street); the other was on an old foundation. Brownie's station was set up on the concrete base of an old winch. The height of the thing was about right, but you couldn't put your knees or legs under the darn thing. It was solid though . . . and how!

Frank and Bill, the dynamic duo, were again taking turns on 20 c.w. I don't believe Frank ever did pick up a microphone. Joe, on the other hand, is firmly convinced that keys are for locks, and nothing else. Bill prefers c.w. but did condescend to work a little 10 s.s.b. Brownie, Sy, and myself flipped back and forth between both modes, as band availability and activity dictated. Brownie had ended the Zulu day on 40 c.w. and was relieved shortly thereafter by Sy who banged away for a little while longer. When the band went watery, Sy switched to 80 and keyed for another hour. C.w. activity waned rather quickly, so Sy shifted to s.s.b. Things were good on phone. Sy peeled off about 90 an hour for the next four hours. During this time I had Station 2 on 160 for one last fling. The noise was bad so contacts were spotty. It was during this session that PY1RO evidently called us —but unfortunately, I couldn't pull him through the QRN. Through someone whose call I don't remember now, we arranged another try a few hours later, at 0600Z. Things weren't good, and I had my doubts, but fortunately, at the appointed time we were able to exchange 349 reports and make a QSO of it. I was particularly happy that we could provide 160 meter contacts to those who had made a concerted effort to get them —in addition to the spontaneous ones.

The boys on 160 were the most vocal single group; in fact, it was as a result of urging from several well-known 160 ops that we included "top band" operation in the planning. Originally we planned to operate only 80—10; fortunately, the R-4/T-4 combo covers 160 so no additional gear was needed. Jim, W2DEO, personally delivered a 160 meter dipole to W2ORA before we left so we were all set, station-wise. Incidentally, while on the subject of special interest groups, I must relate that we did have other requests — Oscar, SSTV, 50 MHz — to name a few. Unfortunately, most required additional gear to one degree or another, which was one of the major factors for consideration. At a round trip freight rate of 0.70 per pound, we didn't want to get too carried away. We did evaluate all requests carefully, and the only one that survived was the 160 operation. Since my station was primarily a "filler" type, plus serving as a backup in case of unrepairable breakdown, the time devoted to 160 didn't detract from other more lucrative operation.

Well, back to the story. Shortly after completing the last 160 QSO with PY1RO it began to rain again. Sy came galloping in to see if he could continue to operate 75 s.s.b. from the refuge of my cozy tent. He had carefully covered the gear at Station 1 and didn't want to chance a repeat of the fireworks of the previous night. This was fine with me; 160 was just a lot of noise now. We snaked the coax for the 80/40 dipole, through the bushes and clipped it to my equipment. A quick band change and we were off again. By now it was past 0600 Z and things were still lively, although the band was stretching out more. The pace was settling down to about one a minute and Sy was able to pull several European stations through the relatively thinner pile ups. While I kept Sy company on 75, Frank and Bill were still at it on 40 c.w., and had been since 20 collapsed, except for a brief fling on 40 s.s.b. Forty fone was a mess, so they had hastily switched back to c.w., where they were still holding a rate of over 50 per hour. And so we went, on into the night.

I think we all shared the same inner feelings, sitting there on the

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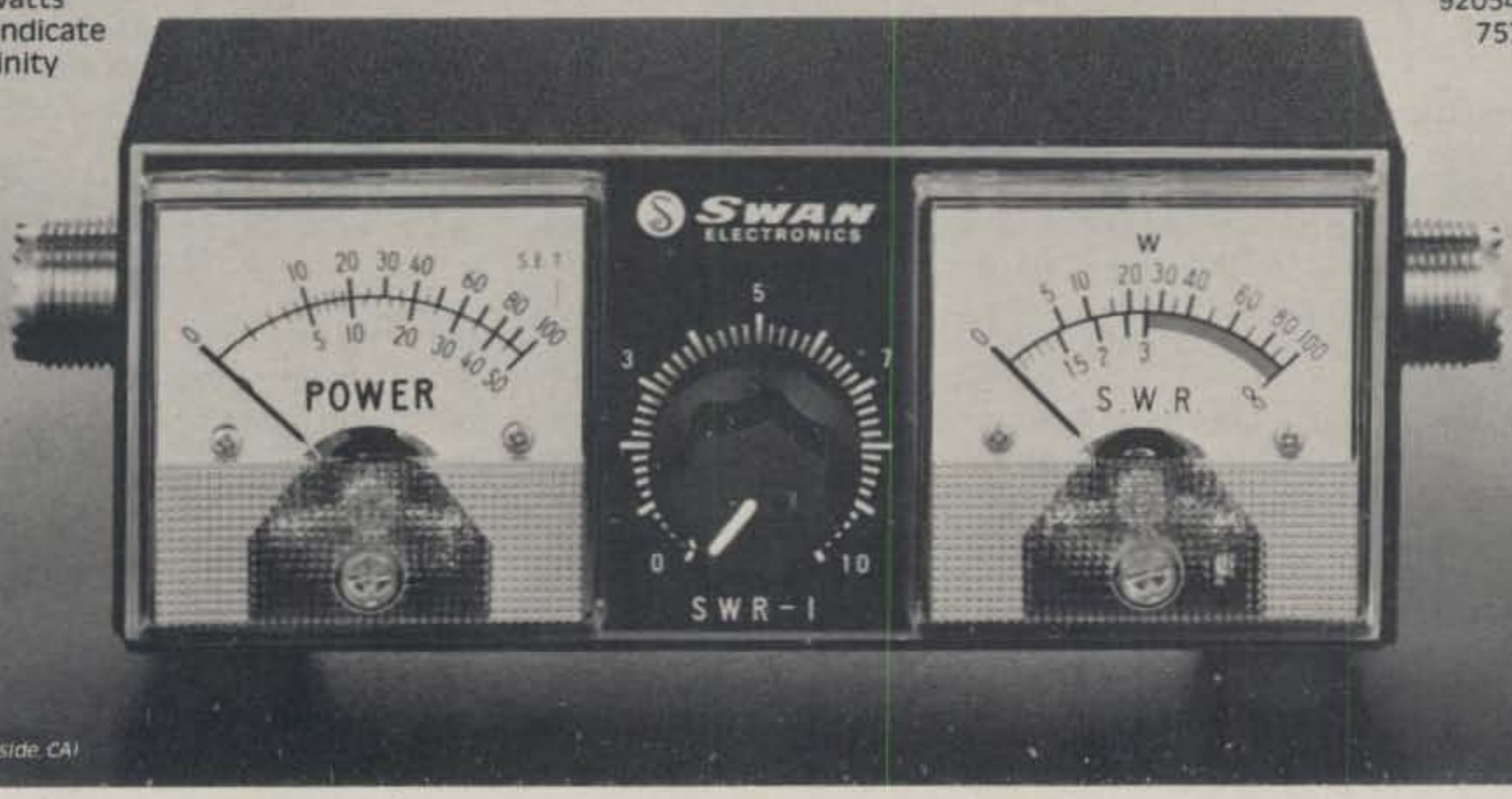

(Prices FOB Oceanside, CA)

rock in the wee hours of the morning. We would be leaving Navassa on Friday, so this was the last chance for KC4NI operation; we wanted to make the most of it. The plan was to shut down when things finally dried up on 75 and 40; get a few hours sleep, and then start dismantling and packing when daylight came. The weather wasn't cooperating too well, unfortunately; the rain had stopped but both 40 and 80 were still quite noisy.

About 0820Z Sy decided he had finally had it. Making contacts had degenerated to a tedious task. The band was pretty well pumped dry, the noise level was high and the signal strengths were down. A few minutes later the boys on 40 c.w. came to the same conclusion and also decided to shut down. I was not sleepy for some strange reason and so I slid into the chair Sy had just vacated. I guess I was still hoping to hear the KL7 we had tried to work earlier with no success (the only state we missed!). A few CQ's produced a couple of QSO's, then nothing. Then, another string of 4 or 5, then nothing again. The band was quieter now—the noise was tolerable and the signals seemed to have a little more oomph. One W0 station worked earlier called in with his observation—he said we were getting stronger again out there. Sparked by these words of encouragement, a few more CQs brought a few more contacts. By now I guessed the problem was lack of activity, even from the west coast, rather than band conditions. Reluctantly, I killed the generator at 0905Z and hit the sack.

A few short hours later I was awakened by the generator for Station 1. Evidently the desire for "just a couple more" had gotten to Joe, too; he was doing his thing on 20 s.s.b. Joe made about 50 contacts in the first half hour and then things thinned out rapidly. The last contact from KC4NI was made with CT1FL a little before 1300Z. Reluctantly, the generator was killed and Joe and Brownie joined the rest of us who were already engaged in the dismantling and packing operation. We hated to cease operation so early, but we figured it would take us five to six hours to get everything taken down and repacked, plus a 12 to 14 hour boat ride. The storm we had encountered on the way over had ruined many of the large packing cartons we had used to group the various station equipments, camping supplies, and miscellaneous items. Fortunately we had decided on the "small boxes in the big boxes" technique, so the individual items were still reasonably protected. In fact, many of the small boxes had been used to make operating positions at Stations 2 and 3, a function they fulfilled very nicely. We had left what was remaining of the larger cartons on the *Maty Sain*, and had transported small loads in the dinghy on our arrival. During one of our scheduled contacts with 6Y5LA, Lloyd said he thought he could come up with some TV/appliance type cartons suitable for repacking all the little boxes. He said he would have them waiting for us when we returned to Kingston. So, the only immediate

A surprise Thanksgiving Day treat—a fish dinner, cooked by one of our Jamaican crewmembers.

K2KA keeping one of the many schedules with Lloyd, 6Y5LA, in Kingston, Jamaica.

problem was where to put all the little boxes on the return trip. Fortunately, the crew of the *Maty Sain* jockeyed things around to get most of the high-value items in the tiny galley. The lesser things were deposited wherever a little space could be found.

Most of the station gear had been safely transported to the boat and secured for the ride home when we got the final shot. A tiny dark cloud had formed overhead and decided to give the KC4NI gang one last spritz. It wasn't much but it did manage to wet the tents we had layed out, ready to be rolled up. Regretfully, we rolled up the damp canvas, making a mental note to remind the Boy Scouts to unpack and thoroughly dry the tents. Having done its damage, the little cloud disappeared and the sun came out. Though it was not quite noon, the dampness and the heat of the sun made all of us feel as though we had our very own sauna bath. However, drippy or no, we finished the packing and gathered at the landing. A couple of the

The calm sea was a blessing for the chore of transferring the gear back to the Maty Sain——a far cry from our arrival!

young crew members from the *Maty Sain* had already transported quite a load of stuff and were back for another. One last frantic picture taking session developed while we figured out how to transport the six of us and the remaining equipment. Two operators plus another big load of equipment made the second trip. For the third and final trip the remaining four operators, accompanied by a small quantity of camping equipment, pulled their way along the line rigged from the *Maty Sain* to the landing ladder. This line had been untied as the last boatfull departed; this action served as both a real and a symbolic severing of our five-day association with Navassa.

Spirits were high as the people and equipment from the last boat were deposited on the deck of the *Maty Sain*. The remaining portion of the transport rope was pulled in and secured. The small boat was brought aboard and stowed. We were just about ready to hoist anchor and head for Kingston. One final check assured us that all of our gear was aboard and secured for the trip. Then, up came the anchor and we were underway. With much picture taking we headed for Kingston at 12:30 p.m. local time.

I'm happy to report that the return trip was relatively uneventful (fortunately!). There was a following sea and the *Maty Sain* seemed to be pushed along ahead of the waves, like a pudgy surf board. It gave the sensation that you were really zinging along, when, in reality, we were probably only doing about 8 to 10 knots. Most of us were scattered around, talking to each other and to some of the crew. As the day and the miles slipped by, we were all beginning to unwind more completely. After a bit to eat, we were even more content to sit back and relax. Things were just great! When it became dark, a big full moon lit the sea brightly. What a far cry from the trip we had coming to the island; the night was beautiful! A few of us were talking about the whole operation, commenting on some of the various high points (and low points) we had experienced. Bill had made some rough counts from the logs and it looked like we had made something over 7,000 total contacts, with Thanksgiving day yielding a banner total of nearly 2500 QSOs. Despite the problems we had getting there and the loss of one full operating day, we all felt that KC4NI was a success. Tired, dirty, and unshaven, we eventually disbursed to find places to rest during the remainder of the voyage.

We arrived at the dock in Kingston at 4 a.m. local time. Obviously, nothing was stirring at this crazy hour, so we adjourned to the dock to sleep, talk, or whatever. About five hours later we finally were able to load a truck with our gear and transport it to Roy Spence's office. Roy, the owner of the boat, had suggested we move everything to his office and do the repackaging job there. We all thought this was a good idea (The business of our missing food goodies was still quite fresh in our minds). When we got there, the ever reliable Lloyd had quite an array of cartons and packing material available for us. We had all agreed that we would finish up the packing chore, get the stuff to the air freight office, and *then* head for the hotel. We each had our own priorities but, in some ranking order of importance, the motivating factors for all of us were shower, shave, clean clothes, cold drinks, and food. Spurred on by these thoughts, the packing job was completed in relatively short order. We made our financial settlement (gulp!) with Roy for the boat and started to tag the open truck, filled with our equipment, to the airport. Murphy was not quite finished with us. About half-way to the airport, it started to rain. We had visions of yet another repacking job as it really began to pour. Fortunately, the truck was able to pull off the road and take refuge under a roof overhang at a gas station before the cartons got too soaked. Unfortunately we got involved in a minor traffic accident while trying to avoid a major collision. Things were settled amicably, but slowly. By now we had observed that things do not move particularly fast in Jamaica except on the highways. We finally got to the air freight office and relinquished our array of boxes for shipment back to Philadelphia. Relieved of our equipment responsibilities (plus another bundle of cash), we headed for the Morgan Harbour Hotel—at last!

When we did finally arrive at the hotel, each did his thing as he saw it. For most I'm sure it was the shower, shave, clean clothes route. One exception to the shave bit was Joe; he proudly sported his fuzzy face, even for a few days after he returned home. (His XYL probably laid down the law about that time.) I can't say for sure, but I'd be willing to bet that Bill's tape worm pressured him into getting a snack, even before the shower. Eventually we all rendezvoused out by the snack bar and guzzled various types of cold drinks, along with an assortment of sandwiches. We went rather lightly

on the food, for the scheduled dinner time was only about two hours away. We all had big plans for that moment! While we relaxed and thoroughly enjoyed ourselves, the time slipped by, as it has a habit of doing. The six of us descended upon the dining room just as soon as it was open for business. We really stuffed ourselves, consuming one heck of a pile of food in the process. But, even hungry DXpeditioners have a capacity limit. When Bill's was finally reached (well after the rest of us) we waddled out to relax by the water's edge. It was a beautiful night, but in our state of contentment, even if it had been snowing—it *still* would have been a beautiful night! Beautiful though it was, the thoughts of a good night's sleep won out a short time later and we headed for our rooms. I did a little mental arithmetic and came up with a rather startling fact; from our departure, until now, I had amassed a grand total of 18 hours of sleep. A little cross checking with the others indicated this was about the average; no wonder we were all quite ready to hit the sack. We did. The next thing I remember was that the room was light; it was morning. We all met out in the lounging area, near the dining room. It was a little too early for the dining room so we all relaxed in the chairs by the water. Already the day promised to be a pleasant one. We were looking forward to a swim later on and it looked like the weather was going to cooperate. The only swimming venture attempted while on Navassa was when Brownie and one of the Jamaican crew members decided to take a dip off the ladder. They were enjoying themselves thoroughly, swimming parallel to the rope strung out to the *Maty Sain*. Then, as Brownie related later, someone on the ship yelled "shark". Reaching the base of the landing ladder in record time, the pair made short work of the climb up the ladder. This ended the Navassa Swim Club. The thoughts of swimming vanished as the sliding doors to the dining room were rolled open. After last night I thought we wouldn't have to eat for a couple of days. But, here we were, making tracks for the chow hall like six kids at the baseball stadium on bat day. As I remember, Bill (who else?) was leading the pack.

Breakfast took quite a while. There was quite an assortment of delicious sounding things on the menu. While the rest of us were carefully considering what we were going to have, Bill took the easy way out—one of each. We were still nursing the orange juice; he was through that, the fresh fruit cup, the cereal, and was putting a dent in one of the main dishes. I've never seen a man of such slight build consume so much food. But, truthfully, Bill wasn't alone. The rest of us were thoroughly enjoying the good food and leisurely pace. We did, finally, disband from the dining room and began to map out the course of action for the remainder of the day.

Before we knew it, the course of action was being executed. Joe, Sy, Frank, and Bill were scheduled to leave on the late afternoon flight to Philadelphia. Brownie and I were going to stay over for a couple of extra days. Our wives were scheduled to arrive on the plane the rest of the fellows would ultimately take home. We headed for the airport and got the four homeward-bound DXpeditioners squared away for the flight. The incoming flight arrived about on schedule and the PAU/FYS XYL's debarked and joined the group. After a few false starts and some delay, the aircraft was ready to head back. The four boarded and we saw them off. This division of the group seemed to signal the fact that the dxpedition was finally completed. We had been through a lot together during the past week. Through it all the rapport of the individuals was excellent. We had begun as friends and now we were finishing the trip as friends—a very nice tribute to the six personalities involved.

Brownie and Shirley and Cyndy and I had a ball the next three days. We explored a little, relaxed, swam, ate, and made the most of our extended trip. Unfortunately, the time was all too short. We headed home on Wednesday, December 4, and joined the other slaves at the salt mine the next day. Needless to say, we did a lot of relating and story telling the remaining two days of the week. All in all it was quite an experience and we all agreed we wouldn't have missed it for the world.

One last note of thanks from the entire KC4NI gang: to Lloyd, 6Y5LA, for his immeasurable assistance—duly noted before but highly worthy of repetition; to the Northern California DX Foundation, Inc.—their donation of the QSL cards was particularly appreciated; to Bob, WA2CFP and Frank, WA2YSW—who kept the phone patches going between Navassa and SNJ; to the amateurs who helped defray the rather staggering cost of the expedition and to all others in general whose excellent conduct and patience made the KC4NI operation a pleasure; and

(continued on page 89)

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Logic Probes...And Now A Simpler One!

BY JOSEPH P. FINCUTTER*, W3IK

What has been your big hang-up in working with Integrated Circuits? Not only are they rather intriguing and somewhat complicated to understand, but they are a source of trouble to test or check—some seem to think. Yes, I guess I have over-simplified it when I implied that they are easy to check or test! But then we are really only interested in what is happening at each pin, and, not on what actually goes on inside the chip. Now that leaves us with determining whether the terminal is "HIGH" or "LO ("1" or "0"). So what we need, really, is a "two-state" indicator in order to trouble-shoot an item of equipment that uses ICs. That does sound simple doesn't it?

Well what do we have around the shack that will suffice? One of the most readily available pieces of test equipment around the shack is v.o.m. or the v.t.v.m. that has a suitable range such as 5 or 10 volts d.c. Using either of these meters will satisfy our requirement. Since the impedances involved in Logic Type circuitry involving ICs is normally low, the input impedance of either the v.o.m. or the v.t.v.m. will not seriously affect our measurements. These meters will easily indicate the presence of a "HIGH" or a "LO". So we really didn't need to worry about not having a piece of test equipment to make the necessary troubleshooting measurements. However, the waveforms (successive "highs" and "los" at some repetitive rate) require interpretation. And sometimes it is difficult to interpret the indication of a v.o.m. or v.t.v.m. because of the frequency of the waveform, because the needle cannot follow the frequency unless it is very low.

Now since the waveforms at the various pins on an IC are rectangular in shape, and it is difficult to see them on a meter, then there are some who say the only way to really trouble-shoot an IC is with an oscilloscope. I won't disagree with that from a highly technical standpoint. Where waveforms are concerned, there is no better way of analyzing them than with a scope. BUT with what kind of a scope? It really takes a "Triggered-Sweep Scope"! How many of us have that in our shacks? NOW, don't be confused by a "Synchronized-Sweep Scope"! If a waveform is recurrent at a fixed rate (frequency) then it can be viewed on a Synchronized-Sweep Scope; but, it takes a Triggered-Sweep scope to view a single pulse that is "aperiodic" (not appearing at a definite frequency continuously). So, if you have the right kind of scope (which normally costs a lot of money) then you need not read on unless you are interested in "another approach" to a Logic Probe.

I have not built a lot of equipment using ICs, but I have built enough to realize that there is a real need for a simple "indicator" in the form of a probe that can be used for quick tests/checks of ICs. Several years ago I built an electronic counter and I had some difficulties, most of which were born when I very accidentally dropped a clip lead that was connected to a +170 volt d.c. supply into a "nest of connections". For some reason 5-volt ICs don't like +170 volts. So I had a big problem trying to find out which were still working and which were not. I used my v.t.v.m. and found out a lot about my ICs; and after a while I was able to interpret the action of the meter needle as it never really did stand still, but tried to follow the waveform that was present at the test point. The meter indication was proportional to the "duty cycle" of the HIGH pulse. (I guess I could just as reasonably said that it was

*5620 Alta Vista Road, Bethesda, MD 20034.

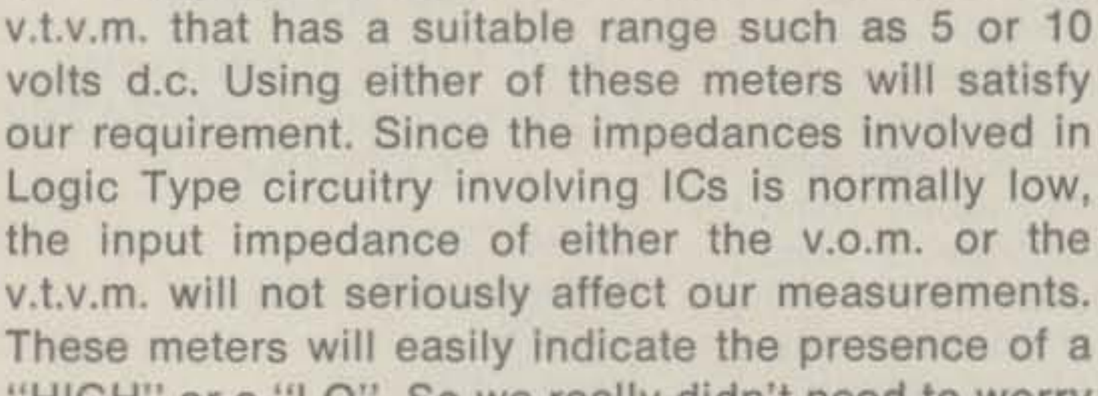
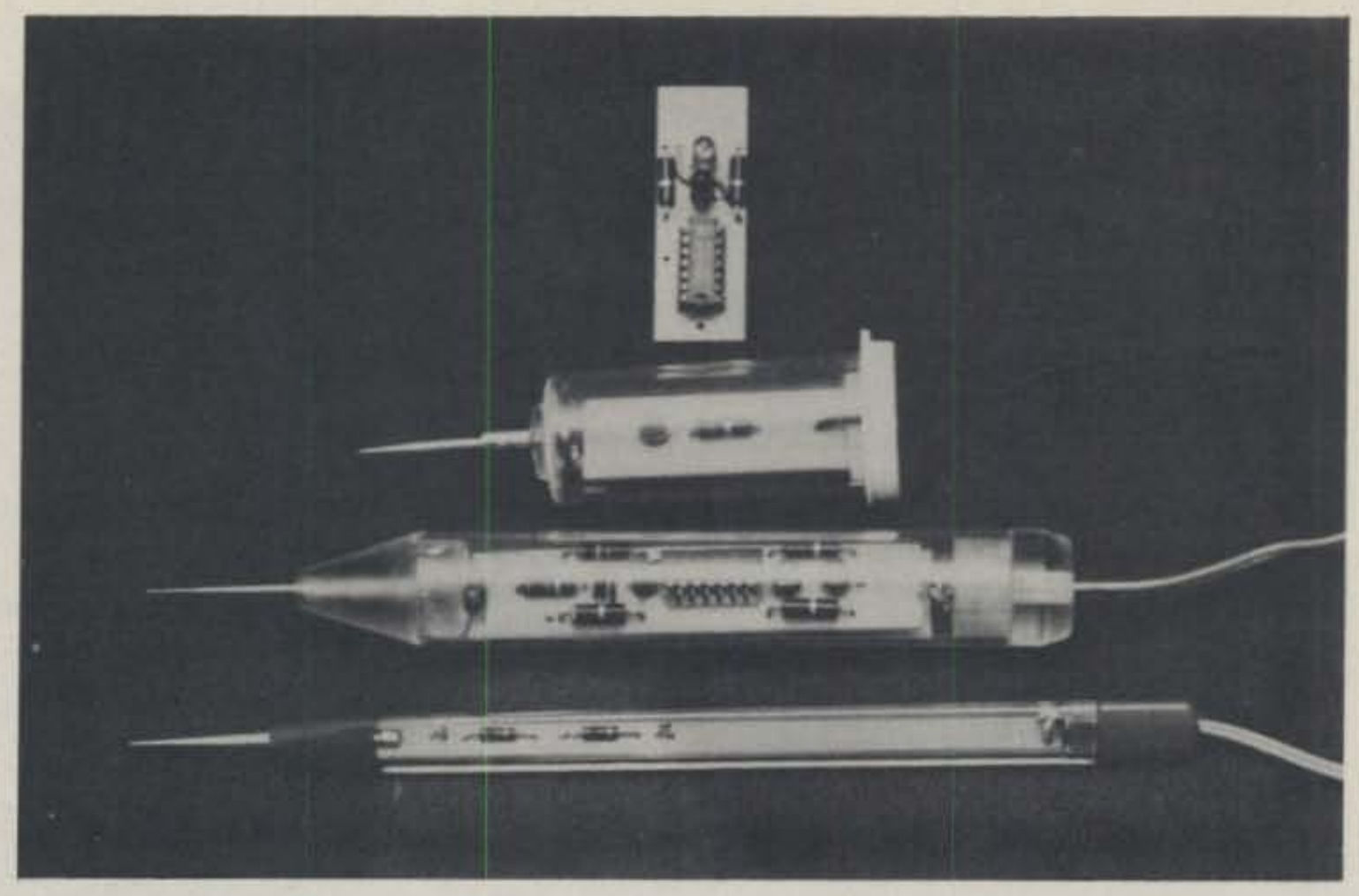


Fig. 1—Circuit diagram of the extremely simple logic probe.

proportional to the duty cycle of the "LO" pulse.)

Not being completely satisfied with the test equipment I had at hand, I sat down at the work bench and started reviewing past issues of the amateur magazines for information on Logic Probes. It's amazing to find what has been written on the subject. The bibliography at the end of this article only lists those articles which have appeared over the past two or three years in the popular amateur magazines. I'm sure that other electronics magazines have published articles as well.



Three probes of varying degrees of complexity; (Bottom) A simple yet revealing, 2 LED probe; (Middle) A complex probe of good design; (Top) A very simple probe with one LED and a substitute PC board circuit with 2 LEDs—both of limited use.

The photograph shows three probes which have been constructed and used in my shack. The top probe actually has two "inserts" which can be used. The PC board directly above the top probe doesn't do enough more than the PC board in the probe to make it worthwhile to make it. The middle probe is a more exotic device and has been very useful; and the bottom probe is the latest venture into the realm of Logic Probes and will be discussed in detail later in the article.

It was while I was constructing the PC board at the top of the picture that two of my faithful cohorts on the 10-meter band with whom I converse daily told me that I was working at the problem the hard way. On this PC board were mounted a 7400 Quad-Two-Input NAND Gate IC, two resistors, a Green and a Red LED. When the circuit was examined closely, the Red LED would light when +5 volts was applied to the PC board; if a "LO" point was touched with the probe, the Red LED would remain lit. But when the probe was touched to a "HIGH" point the Red LED would extinguish and the Green LED would light. So in reality, the only change indicated, after Power was applied, was a "HIGH" input with the Green LED brightly lit (and the RED extinguished). So, since the only real active components on the board being a resistor and a Green LED, it was decided that the 7400 (which acted like a switch) was unnecessary because one should know that he had power connected to the circuit under test. Therefore all that was needed was the simple probe (the top one in the photo) which consisted of a resistor and LED with a probe tip for exploring the circuitry with the circuit connected to ground (—Vcc.) Now this may sound too simple, but one manufacturer of LEDs recently packaged a small Red LED and a resistor in a very small package suitable for mounting next to the various pin connections on ICs so that operation of the IC could be monitored by the lit/extinguished LEDs. Another manufacturer produces a clip that can be placed over an IC such that 11 pins are contacted and the LEDs in the clip indicate a "HIGH" or a "LO" as the case may be and they are expensive!

I built the center probe in the photo several years ago from a *QST* article[1]; however, I made a couple of changes to it. (Who ever builds anything exactly as proposed in an article?) The parts list called for a couple of incandescent pilot lights of a rare and strange breed not normally carried by local parts houses and definitely were not available from the many surplus outlets. Not having the exact transistor nor the pilot lights, I substituted for the transistor and added two LEDs with their associated current limiting resistors in lieu of the two pilot lights. It's a very satisfactory device and I have used it often. When connected to the 5-volt power supply of the circuit board in question, the following conditions can be indicated: (1) "HIGH", (2) "LO", or, (3) Open Circuit with neither LED lit. The input is protected from higher voltages which might be found on a PC Board with a Zener Diode at the input. Although I have only used this probe on TTL ICs, I feel that it could be used on DTL ICs as well without any trouble.

Further discussions with my compatriots led to "Why engineer this thing when it should be done in a simple manner?" Fig. 1 is about as simple as you can get! Basically it is two LEDs with the associated resistors in a simple series circuit which you connect across the power supply on the PC board under test. With power "ON", both LEDs light but at a greatly reduced brilliance. The probe is connected to the junction of the two resistors in fig. 1.

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When the probe contacts a "HIGH", the circuit is thru one resistor the LED and to ground; the 'top' LED in the probe lights up brightly and the other LED extinguishes. When the probe contacts a "LO", the circuit is thru the other resistor and LED ti $+V_{cc}$ and the 'bottom' LED lights up brightly and the other one goes out. And if the probe contacts an open circuit, both LEDs remain lit and at reduced brilliance.

An old triangular-shaped ball-point pen was used to house the circuitry for the probe. A small PC board was made to hold the components and they were so mounted that the "top" LED lit for a HIGH and the "bottom LED lit for a LO. Although I used 1000 ohm resistors for satisfactory brilliance of my LEDs, you might want to use another value because you have a different LED (I have no idea what the type number of my LEDs is because I bought them at a local Hamfest). The only real consideration is for a resistance large enough to prevent loading on the IC being 'probed.'" I don't think that you will find a simpler circuit that will be as useful! Good Luck! ■

Reference

1"Vest Pocket Logic Probe"; KØGKB; QST, August 1972, pg. 46

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SEND IN EARLY FOR ALL CQ CONTEST FORMS AND LOG SHEETS

It's cheap to make, easy to build, and fun to do. Plus all that it works. This plus the W2JTP article elsewhere in this issue can start you on the road to your own antenna farm.

THE TWO METER FISHIN' POLE

BY ONIS COGBURN*, K5VKQ

Need a good inexpensive vertical antenna for two meters but with more gain than the standard ground plane? Then why not try the vertical dipole? This antenna (commonly called the coaxial antenna) has the gain of the ⅝ wavelength radiator but does not need a loading coil or matching network. Furthermore it does not need a groundplane and it radiates as well from the top of a wooden pole as it does from a metal roof. It can be used as either a fixed base antenna or as a mobile antenna. Also as the antenna is complete in itself the importance of a good grounding system is less than for a standard ground plane type of vertical.[1]

Theory of Operation

The standard for vertical antennas is the quarter wave vertical. Characteristics of the quarter wave vertical are high radiation angle, omnidirectionality and input impedance less than 50 ohms. Specifications for non quarter wave antennas are usually made using the standard quarter as a reference.

An artificial ground plane for the vertical antenna can be constructed using 4 or more radial ¼ wavelength long. Characteristics of a quarter wave vertical using this construction are the same as an earth based vertical antenna. As the radials of the vertical are positioned downward or "drooped" the characteristics of the antenna change.

The input of the antenna increases and the angle of radiation decreases. Finally if the radials are positioned parallel and fastened at the end to form a sleeve the antenna will have the characteristics of a vertical half wavelength antenna. Its center input impedance will be approximately 72 ohms and its gain will be about 3 db over the standard quarter wave. Comparison of vertical quarter wave and half wave antenna radiation patterns is shown in fig. 1.

Construction

An inexpensive and efficient half wave antenna can be constructed using a hollow fiberglass fishing rod blank. This can be obtained at your local sporting goods store and should be available for under $6. Everything else you will need can be obtained from the junk box. (See parts list for a complete list of parts.)

Cut about ½ inch from the top of the fishing rod blank. This should provide an opening of about 1/32" to the interior of the rod. Now drill a small hole (3/32" or slightly larger) 19½" below the top of the rod blank halfway through the rod. At the base of the rod drill a hole just large enough to insert the RG-59 cable. Cut a 19.2" piece of steel or brass rod small enough to pass through the hole in the top of the fiberglass rod blank (a model airplane pushrod wire from the local hobby store works well- be sure to paint it to keep it from rusting if it is steel). Strip about 18" of the outer insulation from the RG-59 (do not cut off or remove the shield). Pigtail about two inches of the shield and cut off the center conductor ½ inch above the shield. Solder the 19.2" piece of rod to the center conductor and solder a length of bare wire to the end of the shield pigtail long

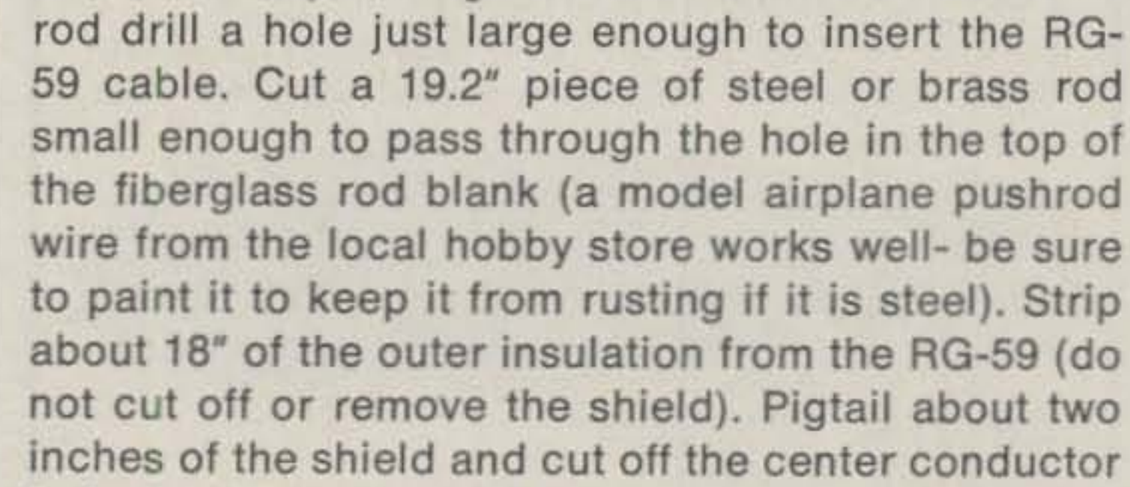

Fig. 1—Radiation pattern for a 1/4 wavelength vertical antenna and vertical dipole antenna.

*Texas A&M University, Dept. of Engineering Technology, College Station, Texas 77843.

[1]Added Gain Using Vertical Antennas, H. W. Kasper, K2GAL, *CQ*, Antenna Roundup, 1963.

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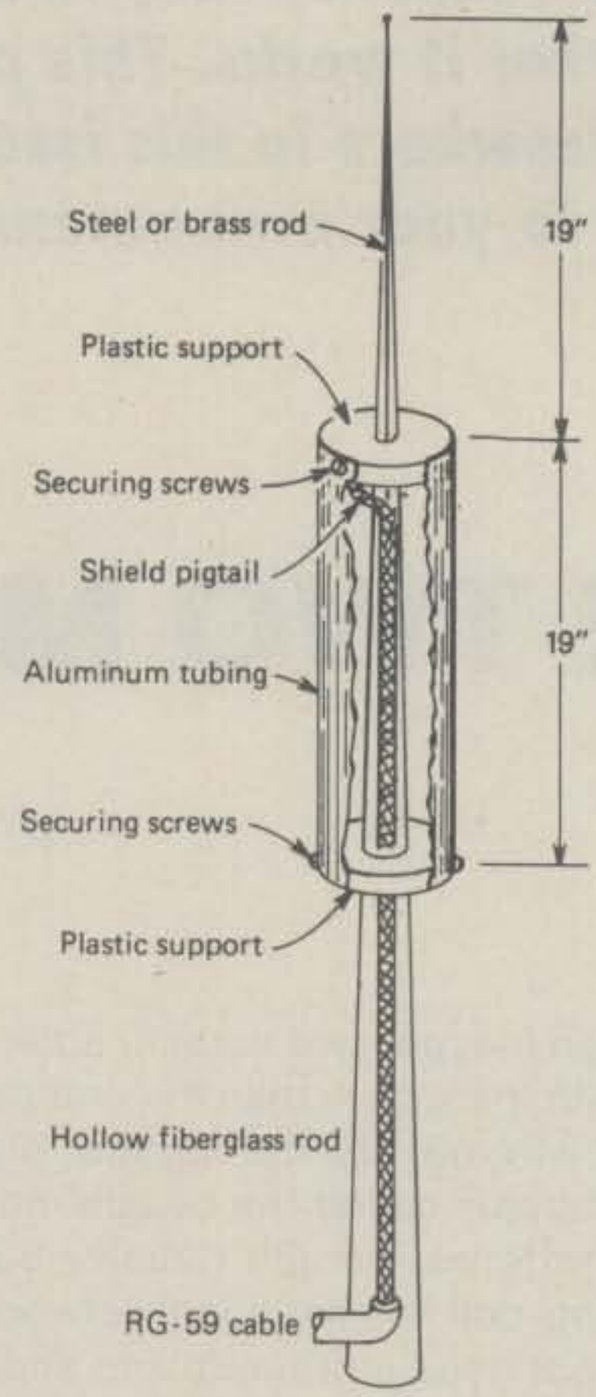

Fig. 2—Vertical dipole construction diagram.

enough to reach the hole in the middle of the fiberglass rod from the bottom (this wire is to ease the insertion of the coaxial cable into the rod). Now feed the bare wire through the hole in the bottom of the fiberglass and out the hole 19½" below the top of the rod. Pull the RG-59 into the fiberglass rod making sure the 19.2" rod enters first (this will be the top quarter wave section of the antenna) pull the coaxial cable up through the fiberglass rod until the shield pigtail protrudes through the hole and the top of the 19.2" rod protrudes through the top of the fiberglass rod. Place a small washer or nut over the 19.2" rod and solder. Cut a 19" length of aluminum tubing (¾" or 1" diameter — a broken lawn chair will work nicely) and support it on the fiberglass rod using a pair of plastic standoffs. These may be fabricated from lucite, plexiglass or one of the XYL's sewing thread spools. Connect a number 6 solder lug to the shield pigtail and connect to the aluminum tubing and the antenna is finished. The aluminum sleeve can be adjusted up and down to tune the antenna with the normal position being 19" from the top of the antenna making the total antenna length 38". The rest of the fiberglass rod forms the mast with additional masting added as needed. If you desire to seal the openings in the

(continued on page 94)

Trouble and disaster seem to occur when we are least prepared for it. Read about some amateurs in many ways just like us who encountered a near tragedy, stuck it out and perservered to a happy conclusion.

VICTORY AT SEA

BY ROBERT McCORMICK*, K4FRX

"Hey! Wait a minute fellas, — I think I heard a breaker in there — go ahead breaker."

The rag chew over a Sunday morning cup of coffee momentarily came to a halt.

"This is VEØ Mike Charlie Mike/marine mobile. We are lost and this is a distress call. Can one of you contact the Coast Guard for us?"

We all heard him in there, weak but Q5. It was just 7:05 a.m., November 2, 1975, and the regular meeting of the Southern Coffee Club at 3933 kHz. was on the air. Several stations claim to have been the first to answer the call for help. At any rate, Glenn, K4ZU, in Sumter, S.C. came on and said he had heard John, WB4JNK down the band, that he was a Coast Guard man, and he would get him to QSY up to this frequency.

In about half a minute John broke in and wanted to know what the trouble was.

"This is VEØMCM/MM. My name is Dave. There are three of us here in a 31 foot sloop. The sea is very rough and we have all been seasick for three and a half days. We left Southport, North Carolina, after taking on supplies and headed for the Virgin Islands for a nice vacation."

Dave didn't seem terribly upset and none of us really realized the seriousness of the situation. As he chatted along, it began to down on us that he really was in deep trouble, especially when he said he thought they were off Cape Hatteras and were in danger of being dashed on the rocks. John told Dave to stand by while he called the Coast Guard station at Southport, N.C. At this point, Tarver, K4OKS, in Saundersville, Ga., broke in to inform the group that Dave, WØPIM/4 had the Charleston, S.C., Coast Guard station listening on the phone patch. VEØMCM began to answer Coast Guard questions via phone patch.

"What was your last bearing?"

Dave complained that the vessel was rocking so much from the heavy seas that the best he could do was 30 degrees, 18 minutes, or 30 degrees 5 minutes North latitude and about 75 degrees, 50 minutes more or less, W. longitude. That's like giving the Coast Guard a 20,000 square mile patch of open ocean to shoot at. Then came questions on the name and registry of the sloop, number of people aboard, any auxiliary power aboard, any marine radio equipment available for use on marine frequencies, and one other thing, — did they have adequate food and water.

The food and water supply was in good shape but VEØMCM said, "Please don't ask me about food, — we're too sick to think about it."

The vessel was named the *Kluanne* (pronounced Ku-lan-ee). They had only one radio rig aboard, an Atlas transceiver and could not go on the Coast Guard marine frequencies. The antenna was an inverted V hanging from the main mast.

The Coast Guard, Charleston, told the *Kluanne*, through the WØPIM phone patch to stand by while they got in touch with District headquarters at Portsmouth, Va. At this point, Charlie, W4DTG, in Portsmouth, came on the air and said the Coast Guard there was copying through his station. It turned out that Charlie is the chief radio operator at Portsmouth, and although off duty, had heard what was going on and was patching the District headquarters in on the problem. Furthermore the Coast Guard was taping the entire proceeding.

Talk about coordination and cooperation, initiative and imagination. It couldn't have been better if it had been planned in advance!

There was a long pause while the Coast Guard checked the registry of the vessel, cut through red tape with the FCC, alerted the Air Wing, and developed a plan of action. Randy, K4EAR and Doc,

*446 Leton Drive, Columbia, S.C. 29210.

Presentation ceremonies at the Executive Mansion in Columbia, South Carolina. From left to right: Governor James B. Edwards, H. R. Randall, K4EAR, "Doc" Taylor, WA4FCX, and Dave Ebert, WØPIM/4. Here the Governor is shown congratulating "Doc" and presenting him with his certificate.

WA4CFX using maximum power, blasted holes in the ether to the *Kluanne*, trying to keep up morale aboard the craft. The frequency was guarded by many volunteers who had been listening, — after all, it was Sunday and a lot of amateurs were up and around, looking for a rag-chew.

At approximately 9:50 a.m., two and three-quarters hours after the first call for help was heard, a loud, strong station came on the air and announced: "This is NMN, Coast Guard, Portsmouth, Virginia. The frequency of 3933 kHz. ±10 kHz. is hereby declared an emergency frequency by authority of the Federal Communications Commission. This station will act as net control."

The delay in Coast Guard action had resulted from Coast Guard procedures to insure that there was no hoax involved, to determine if the registry of the vessel was authentic, to obtain clearance from the FCC to use an amateur frequency for emergency purposes, and to comply with other necessary regulations. Skip conditions being what they were, NMN proceeded to appoint K4EAR as the relay station for messages to and from VEØMCM aboard the *Kluanne*, and WA4CFX as back up net control and to handle message traffic with Coast Guard aircraft being dispatched to seek the sloop. These two stations provided the best copy for the *Kluanne* and the Coast Guard.

Because of the general interference on the emergency frequency, Chief Petty Officer Oliviera at Coast Guard control, Portsmouth, called K4EAR and asked him to announce on the air that the FCC had authorized NMN to control 3933 ±10 kHz, and further, that only four stations were authorized to operate on this frequency, K4EAR, WØPIM/4, WA4CFX and WB4JNK. The announcement was duly made and the interference from other stations cleared up somewhat. Many stations not involved in the action, but listening, helped keep the channels open.

Four Coast Guard C-130 planes were sent out to locate the *Kluanne*. Suddenly NPNJ was heard calling NJPN — two search planes talking to each other on the amateur band — and then NPNJ called WA4CFX. What a delight it was when he said they were copying WA4CFX and K4EAR loud and clear; — and what a lift it must have given the three desperately sick men aboard the sloop.

However, the Coast Guard still had a big question facing it. Where *was* the *Kluanne?*

F.C.C. monitoring stations were called on to help, and the *Kluanne* was asked for a long count. But each time the long count was started, some amateur would inadvertently start to tune up on what he thought was a clear frequency and foul up the determination. Finally the F.C.C., in desperation, asked the *Kluanne* to move to 6995 kHz and put a signal on the air so that an accurate fix could be made. Triangulation finally established that the sloop wasn't off Cape Hatteras at all but at 30° 29′ N. latitude, 74° 45′ W. longitude, about 450 miles east of Jacksonville, Florida.

When this information was relayed to the search planes, one of the C-130's came on the air and said, "Now it's up to us" as they deployed to carry out their search patterns. While the planes went to work, K4EAR continued to relay messages between NJM and the *Kluanne,* and WA4CFX between the search planes and NJM. Great service was rendered by WØPIM/4, in Charleston, S.C., WB4JNK, and WB4TRI/4, Ed of Tampa, Fla., (now a silent key), as well as by many other stations in keeping the frequency clear. Many amateurs, instead of just listening to find out what was going on, insisted on breaking in wanting to know who NJM and NJPN were and what right did they have to clutter up the ham bands?

At 12:35 p.m., five and a half hours after the first call for help was heard, NJPN, one of the four C-130's, relayed to NJM through WA4CFX that he had made visual contact with the sloop and radioed it's exact position. It was an exciting thrill for all hands, those listening and those participating, but mostly for the men aboard the *Kluanne.*

In the meantime, the Coast Guard had been in direct communication with the cutter *Reliance* out of Guantanamo Bay, Cuba. The cutter was immediately diverted toward the vessel. Attempts by the planes to drop portable marine radio equipment to the crew of the sloop were unsuccessful because of the heavy seas. Communications between the *Reliance* and the *Kluanne* were established via NMN and K4EAR.

About 3:30 p.m., VEØMCM called K4EAR and said, "Randy, I'm just too weak to talk anymore and besides, our batteries are running low. Please tell the

Reliance I must shut down. Check back in thirty minutes and maybe I can talk again." He thanked everybody and signed clear.

Randy too, checked out for some well deserved rest while Doc WA4CFX, and the others carried on, keeping the frequency open and relaying for the Coast Guard. Randy came back on the air just before the *Reliance* reached the *Kluanne* about 7:15 p.m. The crew found the men so sick and weak that they had to be strapped into a stretcher basket for transfer to the *Reliance* sick bay. The sloop was finally secured and taken in tow.

At 8:20 p.m., the Captain of the *Reliance* came on the frequency, thanked all hands for their help in keeping the long vigil, and stated that two of the men were in bed in the sick bay but that Dave, VEØ-MCM, wanted to say a few words. Although very seasick, he thanked the amateurs profusely. The Captain declared the emergency use of the amateur frequency at an end.

The *Reliance* reached Wrightsville Beach, N.C., about 3:05 a.m., the men were transferred to the hospital, and the Coast Guard declared the emergency over. It was a happy ending to a long Sunday that started out as a morning ragchew over a cup of coffee.

But that's not the end of the story.

The Governor of South Carolina, The Honorable James B. Edwards, declared the week of May 10-16, 1976 as Centennial Amateur Radio Week. As a fitting climax to special activities by South Carolina amateurs during that week, the Governor in a public ceremony at the Executive Mansion, presented K4EAR, WA4CFX and WØP-IM/4 with special identical citations.

The citation received by Randy reads as follows:

CITATION BY GOVERNOR JAMES B. EDWARDS
TO
K4EAR HENRY R. RANDALL

WHEREAS, on November 2, 1975, three South Carolina amateur radio operators participated in the rescue of a distressed vessel, the Kluanne, off the coast of South Carolina; and

WHEREAS, K4EAR, Henry R. Randall played a major role in this rescue by demonstrating an exceptional degree of responsibility and compassion; and

WHEREAS, the people of the State of South Carolina can be justifiably proud of his dedication in assisting in this rescue operation;

NOW, THEREFORE, I, James B. Edwards, Governor of the State of South Carolina, do hereby commend:

K4EAR HENRY R. RANDALL

and extend my appreciation for his selfless action in this rescue operation.

(signature)

James B. Edwards

On behalf of all amateurs everywhere, and in the best of American tradition, I say, "Well done." ■

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Results of the 17th Annual CQ 160 Meter DX Contest

BY DONALD McCLENON, *W3IN

TOP 20 WORLD SCORES

KV4FZ	176,936	AA2SPL[1]	58,890
K1PBW	133,536	WA5RTG	56,560
AC3IN	88,480	AC9SZR/3	56,280
G3SZA	80,937	W5SUS	56,028
W4YWX	70,950	PAØHIP	54,606
GD4BEG	69,454	K4QMQ[1]	54,000
WA1RFM/VP9	66,092	GM3YOR/P[1]	53,865
W4PRO[1]	65,240	K5LIW[1]	53,130
W5WZQ	65,052	W2DXL	50,816
K8CCV/8	60,760	AD8HKB	48,374

Worldwide 160 meter contest conditions were somewhat below those of last year, with a considerable increase of QRN the second night, in most areas. This reduced the activity, and no new score, QSO, multiplier, or DXCC country records were made.

The highest score of 176,936 points was made by last year's winner, KV4FZ. The second spot, and highest USA score, was 133,536 points by K1PBW. The top 20 are shown in the score box, with multi-ops indicated. Multiop station crews are shown at the end of the score listings.

All Continents, all 50 States, 10 Canadian Provinces, and 51 Countries were active, so there was a possible multiplier of 107. Some of the rarer prefixes on, who did not submit logs included EP, GC, HK, KG4, KL7, PJ8, VP2D, VP5, VS5, VS6, YS, ZE, ZL, 6Y5, 9H1. Note these good ones who *did* submit logs: MM/FM7/PZ, JD1, LU, OA, OH0, VK, VR1, 4X4, 9M2. There were at least 97 different OK's active, 168 Japanese stations, and 202 different G's. For the first time, more DX logs were submitted than from W/VE. Please send in your log, however small, to demonstrate contest interest.

No one reached last year's multiplier top of 81. AC3IN was high with 80, followed by K1PBW and W5WZQ 78, W4YWX 75, and K4QMQ 72. K1PBW matched his last year top total countries worked of 29. He was followed by AC3IN 26, KV4FZ and W5WZQ 25, GM3YOR/P 24, and G3SZA, W4YWX, W4PRO all 22. Top QSO leaders were K1PBW 392, AC3IN 369, W4YWX 345, W5SUS 334, and W4PRO 330. Nine others were over 300, KV4FZ being the only one outside W/VE. Top European QSO leaders were GD4BEG 273, PAØHIP 255, G3SZA 247, G3KMI 234, G4BUE 228, GM3YOR/P 214, GM3IGW/A 209, OK1ATP 206, and DL0KF 201. QSO leaders on other continents were JA7NI 140, KH6IJ 135, KH6CHC 122, YV1OB 102, and JA2AAQ 100.

Special excitement was provided by OK4FCA/MM aboard merchant ship *Bratislava* bound for Rio de Janeiro from Houston, Texas. His vertical antenna top was 35 meters above the water. The first night he was near Martinique, and the second night he was near Surinam. He was careful to work each station only once, and everyone working him was credited with a multiplier and a DX contact, whether claimed or not. G4EOK was also on a ship (*HMS Belfast*), a moored 1939 museum cruiser with the antenna 100 feet above water.

We will try to reword the rules to remove some

*11310 Cedar Lane, Beltsville, MD 20705

[1]Multi-op stations. Operators listed elsewhere in this report.

G4EOK operated aboard the HMS Belfast with the antenna 100 ft. above the Thames River.

confusion that still exists. No one may ever count either W or VE as a multiplier. Count only the States and Provinces worked, plus DX. Every DX station should count the first station worked in his own country as a multiplier. KH6 and KL7 are treated as DX countries, but they may not also be counted as States, and for Contest purposes, there are only 48 possible State multipliers.

Certificates are being sent to each State, Province, and Country winner for this 17th Annual Contest. Two of these races were extremely close. If W5SUS had worked 1 more DX station or 4 more W/VE's, he would have passed winner WA5RTG in Arkansas. If KH6IJ had worked 2 more W/VE's or 1 more DX multiplier, he would have passed winner KH6CHC in Hawaii.

Don't miss the next running of this event with the same rules, on the last full weekend of January 1977 (Jan. 28, 29, 30). Pass the word to the 160 gang and send SASE to *CQ* Magazine if you want more log and summary sheets.

73, Don, AC3IN

W4PRO operators (l. to r.): W4HBK, W4GSM, W4PRO, WA4DUS, K3RUQ. We all needed that "This is Fun" reminder in the Saturday night QRN.

W4YWX the King of Georgia was 5th Worldwide High Score. He does lots of things right each year.

Soapbox

DX-Made my first trans-Atlantic contact after 4 years of trying! . . . G4ALG. Used two 130 ft phased driven verticals with approx. 3 miles of earth mats . . . GD4BEG. Too often contests seem to coincide with bad conditions. I was lucky to get HC1XG for a new one . . . EI9J. Very good DX conditions. Heard many North Americans, but couldn't raise any . . . OK1JER. Lots of static charge noise from blowing snow. Thanks for the excellent contest, and keep it up . . . G3SVM. Enjoyed my first 160M DX Contest very much . . . DL7HU. The Atlas 180 is not a good c.w. receiver, but I will come again next year . . . OH0NI. As always, enjoyed the contest very much . . . G4BXT. Sunday morning about 200 EU stations caused too much QRM to hear much DX .. . PA0HIP. Heard KV4, YV, PY, W, VE, but not very good conditions . . . OK1DXW. W stations should spread out more . . . G4BUE. Poor conditions, but there were some nice peaks. Couldn't raise KV4FZ, a few JA's, and several W's . . . 4X4NJ. Just got drawn into the Contest. Hope you can make sense out of my log . . . VR1AA. Two hours late starting and couldn't work second night at all. Will be back again next year . . . WA1RFM/VP9. Conditions were poor. Called several DX statians many times without success . . . OH2BO. Problems with interference from 1800-1807, but good activity . . . G3SZA. Heard

JA2UEO proudly displays his 1.8 MHz WAC certificate.

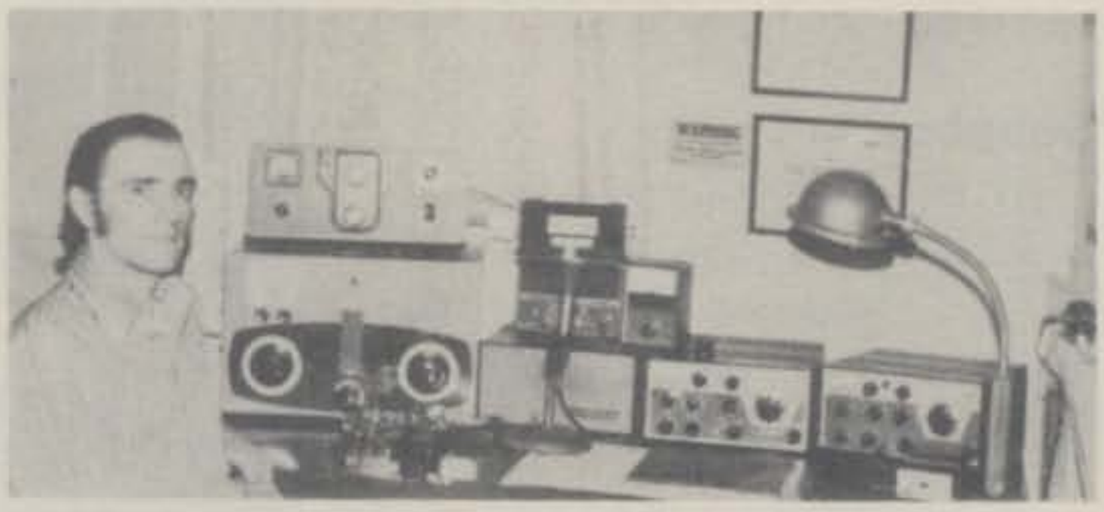
AC9PNE has been doing well on 160 longer than many other hotshots.

about 30 W/VE stations, but could only work 3 with my low power . . . DJ6TK. Our ship QTH had fluctuating power and an outage part of the time . . . G4EOK. Low QRN first night and very high the second. I could only take so much, and had to throw the switch. Better luck next year . . . OA8V. Enjoyed the contest, but couldn't raise VK, W, VR1, 9M2, VS6, KH6. Must improve antenna next year . . . JH1ZKP. Summer is not a good time to work in test from this part of the world. QRN very S9 +40db at 0500Z and had to quit. Second night hopeless . . . LU1DZ. First night lively activity, but second night not very productive . . . KH6CHC. The tropical QRN was S9 plus 10 db . . . YV10B. There should be some rules for the Maritime Mobile situation. Thanks for nice contest and see you in the next one . . . OK4FCA/MM.

W/VE-Great contest, as usual. Wish there were more than one per year . . . W4YWX. Good European opening first night. Local storm QRN level high on second night . . . W5WZQ. Antenna sorta strung along the wooden fence in the back yard, six feet high . . . VE6WX. My first, and it was fun . . . W3BWZ.

WA7OFH has a full wave double zepp between the tower and the trees.

High wind got one tower of my phased array just before the contest, so was on one vertical. As always, a most enjoyable contest . . . W4TMR. Trying to stay awake is more of a challenge than the contest itself . . . WA7PEZ. Nobody can be as pleased as I am. A neighbor let me run part of my antenna into his yard. It enabled me to work my first six Europe. Thanks for a wonderful time . . . AD8MFO. Many DX stations with good signals. Next year will put in more time . . . WA9BWY. Friends talked me into giving them a MO contact, but others called, and there I was in the contest. It was a real booger with only a 6 kHz receiver filter . . . WB0PNW. Nice contest this year. Luck to all . . . W8KAZ. A good contest but with high QRN. See you next year . . . VE5DX. 160 band conditions have been good this season, but were poor during the contest, with very weak European signals . . . W0NFL. Enjoyed working two KH6 in ten mins. Oh that Sat night static! . . . W1WY. Short EU opening first night. Second night QRN cut QSO volume, but beat last year's score . . . AC3IN. XYL climbed tower to help string up long wire. It got me WYO and now only need KL7



Washington was well represented by WA7OFH using this neat layout and a full wave double zepp outside.

. . . KØJPL. Miss those long Beverage antennas I had at old QTH . . . W3JSX. Few Europeans heard. Because this contest is so popular, it was great fun working the old pros around the western hemisphere . . . WØAW. If I had a point for every station called, I would win this thing! Enjoyed it, and hope to have more signal next year . . . VE6CGS. FB contest. Got 3 new countries . . . K4CYU. Great time as usual. Condx poor to fair. Fine operating by a great bunch of fellows . . . W1BB. Contest left me exhausted and with a bad cold, but it was worth it . . . W3AJS. Contest was great and got a new country . . . WA7OFH. Heard JA2GQO but couldn't raise him . . . WØAIH. Doubt if I will spend this much time on a contest again. It's lots of fun if you can stand the long hours . . . W5SUS. I have finally almost licked antenna problems (5 Beverages). Excellent operating by nearly everyone . . . K8CCV/8. Good contest, lots of activity, but second night QRN made me quit . . . W0GK. As always, a very interesting contest. Heard 4X4NJ, ZE2KV, OA8V, VK2AHK, LU1DZ, PY1RO. WAC available if I had the punch . . . VE1ASJ. Had a lot of fun in the contest. High point

Number groups after call letters denote score, total QSOs, DX QSOs for W/VE; W/VE QSOs for DX, Multiplier, and DXCC countries worked.

Connecticut

W1WY	23,422	195	11	49	10
W1BIH	12,212	118	6	43	8
WA1UAD	4,080	64	1	30	3
WA1UAC	3,538	53	2	29	4

Massachusetts

K1PBW	133,536	392	116	78	29
W1MX[1]	33,152	208	22	56	14
W1PL	20,586	155	16	47	10
W1BB	7,350	43	26	25	17

New Hampshire

W6MZW/1	23,214	156	16	53	13
W1GJE	16,650	161	6	45	7

Vermont

K1IIK	7,040	110	0	32	2

New Jersey

W2CUC	1,558	37	1	19	3
W2BP	1,280	20	5	16	6
W2MPP	896	32	0	14	2

New York

AA2SPL[1]	58,890	289	41	65	20
W2DXL	50,816	273	31	64	17
K2BQO	8,064	72	10	36	10

Maryland

AC3IN	88,480	369	46	80	26
AC9SZR/3	56,280	304	29	67	17
AC3USS	15,456	172	3	42	5
W3BWZ	9,048	100	4	39	6

(Opr. WA1FEO)

Pennsylania

W3JSX	35,728	236	18	58	13
W3AJS	20,304	200	4	47	5
W3UHP	19,740	190	5	47	7
K3EF	6,512	68	5	37	6

Alabama

K4BHG	29,184	220	9	57	9
K4MG	1,848	42	0	22	1

Florida

K4YFQ	38,144	194	26	64	21
K4KIU[1]	31,008	201	18	57	17
AC4OZF	6,160	68	5	35	7

Georgia

W4YWX	70,950	345	31	75	22
K4QMQ[1]	54,000	279	24	72	21
K4KZP	6,596	93	1	34	3
WB4RUA	3,596	54	2	29	3
AD4BAI	728	28	0	13	1

Kentucky

W4KFB	4,774	77	0	31	2

North Carolina

W4TMR	26,010	227	7	51	8

South Carolina

K4CYU	16,928	136	12	46	12

Tennessee

K4PUZ	26,400	212	7	55	9

Virginia

W4PRO[1]	65,240	330	34	70	22

Arkansas

WA5RTG	56,560	324	20	70	18
W5SUS	56,028	334	18	69	17
W5MYZ	3,016	58	0	26	2

Louisiana

W5WMU	15,456	156	3	46	5

New Mexico

W5UTV	2,058	49	0	21	2

Oklahoma

K5CM	11,088	122	1	44	3
WA5VAP	6,808	88	1	37	3

Texas

W5WZQ	65,052	305	28	78	25
K5LIW[1]	53,130	300	21	69	19
W5ZSX	40,824	264	15	63	13
K5JVF	29,862	193	11	63	13
W5FIX	14,664	132	6	47	8
K5WIQ	2,496	48	0	26	2

California

WB6PXP[1]	35,960	222	22	58	15
W6KQG	29,000	198	13	58	14
W6RW	17,664	144	11	46	9
WB6ZVC/6	10,290	95	13	35	7
AD6MO/6	7,626	91	8	31	6
W6OKK	3,784	74	3	22	4
W6DQX	2,784	42	4	24	5
W6JU	2,320	54	1	20	3
AA6LBP	1,316	39	2	14	4
WB6CBY	216	12	0	9	1
W6DGH	52	13	0	2	1

Montana

W7LR	6,664	98	0	34	2
K7CPC	1,056	33	0	16	2

Oregon

WA7PEZ	6,080	83	3	32	4

Utah

WA7OAU	5,824	75	4	32	5
W7ZC	3,538	61	0	29	1

Washington

WA7OFH	14,220	138	5	45	6

Wyoming

W7TO	3,654	63	0	29	2

Michigan

K8HLR[1]	42,334	303	11	61	12
W8KAZ	15,698	155	3	47	5
WA8TDY	3,016	50	2	26	4
WB8IOT[1]	2,070	45	0	23	1

Ohio

K8CCV/8	60,760	319	29	70	18
AD8HKB	48,374	261	25	67	20
AD8MFO	43,248	250	17	68	15
WA8YEE[1]	38,796	270	12	61	11
AD8SJU[1]	18,620	150	10	49	11
W8EX	3,886	55	3	29	5
W8PCS	3,192	53	1	28	3

West Virginia

K8OQL	9,176	120	1	37	3

Illinois

W9YYG	35,380	257	12	58	10
AC9PNE	31,560	207	14	60	12
W9OHH	14,504	132	4	49	6
AD9UKM	13,284	150	3	41	5
W9UDK	7,828	103	0	38	2
W9ABA	5,440	80	0	34	2

Indiana

AC9LT[1]	37,642	275	11	59	11
WA9BWY[1]	29,256	236	10	53	10
W9EI[1]	22,134	205	3	51	5

Wisconsin

K9DAF	8,640	100	2	40	4
WB9DWG	7,000	100	0	35	2

Colorado

WA2WMT/Ø	20,776	196	4	49	5
WØPHF	14,976	140	4	48	6

Iowa

WØNFL	31,598	219	10	61	11

Kansas

WØLNZ	11,172	133	0	42	2
WØPSF/Ø	6,090	79	2	35	4

Minnesota

WØAW	44,268	309	12	62	12

Missouri

KØJPL	25,740	210	6	55	8
WBØPNW	16,856	156	4	49	6
WØGK	13,708	145	1	46	3

Nebraska

WØAIH	45,568	316	10	64	10

North Dakota

WØZTL	5,040	66	1	36	3

Canada

New Brunswick

VE1ASJ	47,970	213	39	65	21

Nova Scotia

VE1CD	21,252	139	23	46	13

Quebec

VE2WA	7,056	82	4	36	6

Saskatchewan

VE5DX	15,312	162	3	44	4

Alberta

VE6CGS	5,632	76	3	32	4
VE6WX	3,976	71	0	28	2

Aland Island

OH0NI	425	17	0	5	5

Argentina

LU1DZ	1,595	16	13	11	4

Australia

VK5KL	44	5	0	2	2

Austria

OE3IBW	4,482	102	0	9	9
OE1KU	1,380	57	0	5	5

Bermuda

WA1RFM/VP9	66,092	163	160	41	5

Czechoslovakia

OK1ATP	30,723	206	20	33	19
OK1MDK	14,559	147	9	23	17
OK2PGF	13,251	168	5	21	18
OK1FCW	11,916	171	5	18	15
OK1KSO/P[1]	10,728	156	1	18	18
OK2BTW	8,466	134	4	17	16
OL5ATG	8,385	157	1	15	15
OK1DKW	7,830	146	1	15	15
OK2PGU	7,072	125	3	16	16
OK1AYY/P	6,552	147	0	12	12
OK3KFO	6,496	132	1	14	14
OK3CWQ	6,328	132	1	14	14
OK1HAS	6,006	119	1	14	14
OK1AXD	5,390	134	0	11	11
OK1IDK/P	4,584	107	0	12	12
OK1DJK	4,164	100	0	12	12
OK2PAW	4,015	106	0	11	11
OK1AUI	3,960	107	1	12	12
OL8CCH	3,892	85	1	14	14
OK1DCF	3,732	96	1	12	12
OK1DXW	3,700	107	0	10	10
OL9CEI	3,600	96	0	12	12
OL4ATY	3,430	98	0	10	10
OK2YF	3,260	94	0	10	10
OK1KBN	3,102	84	0	11	11
OK1DDL	2,838	84	0	11	11
OK2QX	2,475	91	0	9	9
OK3ZAR	2,460	81	0	10	10
OK3TFE	2,430	90	0	9	9
OK1MIZ	2,420	76	0	10	10
OL3ASW	2,412	79	0	9	9
OK1KRY[1]	2,079	77	0	9	9
OL8CCG	2,079	78	0	9	9
OK3FON	2,035	63	1	11	11
OK1JER/P	1,808	80	0	8	8
OK1JEN	1,728	57	0	9	9
OK3CFT	1,632	66	0	8	8
OL9CFE	1,220	31	0	10	10
OK2SLL	1,197	63	0	7	7
OL5ATZ	1,120	62	0	7	7
OK3TOA	1,080	45	0	8	8
OK3YCV	1,043	55	0	7	7
OK2BKT	1,026	42	0	9	9
OK1DAQ	987	45	0	7	7
OK2PGN	968	38	0	8	8
OK2SBB	707	37	0	7	7
OL9CEF	368	40	0	4	4
OLØCFI	300	44	0	3	3
OK1AIJ	243	36	0	3	3
OK3EQ	236	22	0	4	4
OK3RRC	235	16	0	5	5
OK1AEH	195	25	0	3	3
OK1AZW	186	28	0	3	3
OK3CCT	60	11	1	2	2
OK2BQL	54	6	0	3	3
OL1ATV/P	42	21	0	1	1
OK1OVS	14	7	0	1	1
OK2KPS	4	2	0	1	1

England

G3SZA	80,937	247	101	51	22
G3KMI[1]	35,770	234	34	35	18
G4EOK[1]	20,763	176	21	27	16
G4BUE	19,008	228	9	22	17
G3YMC	9,996	167	4	17	15
G4BXT	8,789	138	5	17	15
G3SVW/A	8,381	133	4	17	16
G6UW[1]	7,005	118	3	15	14
G2DMR[1]	6,071	129	1	13	13
G4ALG	1,180	31	1	10	10
G4BWP	1,022	49	0	7	7

Finland

OH2KA	5,866	84	1	14	14
OH2BO	4,088	58	1	14	14

Germany, Fed. Rep.

DLØKF	25,340	201	10	28	20

OPr. DJ7SW

DJ6TK	11,628	134	3	18	17
DL7HU	3,330	71	1	10	10
DL1YA	2,376	63	0	8	8

Gilbert Islands

VR1AA	1,480	32	5	8	6

Hawaii

KH6CHC	44,772	122	97	41	9
KH6IJ	44,289	135	105	37	6

Ireland

EI9J	22,785	116	31	31	15

Isle of Man

GD4BEG	69,454	273	68	41	21

Israel

4X4NJ	4,250	44	6	17	13

Japan

JA7NI	5,016	140	19	11	9
JA2AAQ	2,430	100	2	10	10
JA2UEO	2,052	94	2	9	9
JH1LKH	1,316	85	0	7	7
JA1CUW	735	66	0	5	5
JA6LCJ	652	53	6	4	4
JA6YBR	444	71	0	3	3
JH1ZKP[1]	234	57	0	2	2
JH2IRH	62	31	0	1	1
JA9CWJ	42	21	0	1	1
JA4AQR/3	8	4	0	1	1

Malaysia, W.

9M2AX	575	23	0	5	5

Martinique/Surinam/MM

OK4FCA/MM	10,875	42	33	29	11

Minami-Torishima Is.

JA8IEV/JD1	3,150	83	7	7	6

Netherlands

PAØHIP	54,606	255	36	38	20
PAØINA	1,820	36	1	10	10

Peru

OA8V	14,280	54	48	28	8

Scotland

GM3YOR/P[1]	53,865	214	44	45	24
GM3IGW/A[1]	27,725	209	17	25	16
GM4ASY	14,421	114	15	23	15

Venezuela

YV1OB	42,240	102	90	44	14

Virgin Islands

KV4FZ	176,936	308	213	68	25

Wales

GW3GWX	1,260	27	1	9	9

Check logs are gratefully acknowledged from the following:

W1HGT, W4AWS, W6TYR, OK1DEN, OK1HAG, OK1MCW, OK2BOB, OK2PGG, OK3CPY, PAØPN.

was VK2AHK calling me . . . W1HGT. Will be back in Idaho as W7HZL next year from my antenna farm . . . W5UTV (There goes the New Mexico multiplier!) Almost missed the contest. My Dec. issue came just 2 days before . . . WB8IOT. Heard OH2BM the second night, but QRN so bad, we didn't dare call; couldn't be sure who he came back to . . . AC9LT. Happy to get KL7JDO confirmation . . . K5LIW. Lost the big vertical and had to use top hat loaded 20 foot one with 40 radials . . . WØPSF/Ø. This is a real good contest. Was disappointed by second night QRN. Looking for a better deal next year . . . VE1CD. Great contest. Condx not as good as last year . . . W6MZW/1. Really enjoy this contest. Plan on being back in 1977 with more power . . . W4KFB. Participation was down, probably due to poor condx the second night . . . K1PBW. Highlight was a string of 9 DX QSOs . . . W4PRO. Had a good time in spite of high QRN. See you next year . . . W8PCS. Only on one night. Hope to be in many more of these . . . AD8SJU. Station description: T4XB, R4B, HAL keyer, coffee, and cokes . . . AC9PNE. G and ZL contacts only 40 minutes apart . . . WA5RTG. Lost both xmtr and ant during contest, and missed last 11 hours. Next year will have spares! . . . AA2SPL. ■

Multi-Op Station Crews

W1MX: W2QHQ, WA4TTG, WA0UCU. **AA2SPL:** AA2SPL, AB2OEU. **K4KIU:** K4KIU, K8KAS. **K4QMQ:** K4QMQ, K4DBV. **W4PRO:** W4PRO, K3RUQ, WA4DUS, W4GSM, W4HBK. **K5LIW:** K5LIW, W5LUJ. **WB6PXP:** WB6PXP, K6BCE, WB6CEI, W6PVB. **K8HLR:** K8HLR, WA8EDC, K8IDE, WA8JUN. **WB8IOT:** WB8IOT, WN8VBC. **WA8YEE:** WA8YEE, K8POJ, WB8UKX, WN8WMU. **AD8SJU:** AD8SJU, W8QHW. **AC9LT:** AC9LT, WA4DAA. **WA9BWY:** WA9BWY, WA9VYJ. **W9E:** W9E, W9NJD. **OK1KSO/P:** OK1AEZ, OK1AAU, OK1WT. **OK1KRY:** OK1AQO, OK1DCM, OK1-19634. **G3KMI:** G3WIE, G3ZBU, G3ZER, G3ZYW, G4AMI, G4CBO, G4CIG. **G4EOK:** G3HZL, G3LIK. **G6UW:** G4AOL, G3ZHL, G3ZZA. **G2DMR:** G3LCH, G4CWH. **JH1ZKP:** JA1CFJ, JA1QML. **GM3YOR/P:** GM3YOR, GM3OLK. **GM3IGW/A:** G3IGW, G4MH.

DJ6TK always enjoys the contest. He hears many he can't raise. Don't we all?

CQ Reviews: The Heathkit SB-614 Station Monitor

BY HUGH R. PAUL*, W6POK

Listening on the high frequency amateur bands, you hear a good many s.s.b. and c.w. signals that are of poor quality. The majority of these problem signals are due to mis-adjustment of operator controls on the exciter or amplifier.

If you rely on other operators telling you when problems exist, forget it. Some things your best friend won't tell you about. If you are creating interference, someone from up the band will no doubt move down and let you know. Why suffer that kind of embarrassment? For a modest cash outlay you can insure yourself against these difficulties.

Heathkit pioneered the low cost r.f. monitor scope for amateur radio use. Several different models have been developed over the years and their popularity is attested to by the fact that a good used one will hardly last a day on the shelf of most amateur supply houses.

Their latest offering is, in my opinion, their best. Completely solid state except for the cathode ray tube, it's a versatile instrument. In addition to monitoring transmitter output, it can be used as a normal oscilloscope for limited test applications, where high sweep frequency or high vertical amplifier gain are not required.

The earlier SB610 monitor scope featured a provision for monitoring a received signal by displaying the receivers i.f. signal. There were two problems with this. The receiver had to have either a 9 MHz or 455 kHz i.f. frequency. This method gave a display that could tell you a great deal about the received signal, but could also be misleading due to the displayed waveform being affected by the bandpass characteristics of the receiver. This feature has been eliminated in the SB614.

By connecting the audio output of *any* receiver to the vertical amplifier, you can display the demodulated waveform of the received signal. This method is still subject to the effects of the receivers bandpass characteristics, but the resulting display will in my opinion, provide you with as much valid information on the received signal as would the i.f. monitoring system.

While the scope is not a wide band unit, it is more adequate for amateur use. Shortly after assembling the SB614 I was faced with a repair job on my children's TV set. The wide band scope I normally use was at the office, so the SB614 was pressed into service.

Three internal sweep ranges are provided on the SB614, 100 Hz, 1 kHz and 10 kHz. Other sweep frequencies from an external source may be applied through an input jack to the horizontal amplifier. By

*291 Macalester Dr., Walnut, A CA 91789

Front view of the Heathkit SB-614 Station Monitor. All controls are clearly labeled with the operational mode displayed in red letters on the black panel above the operating controls. (Photo by Sandra K. Paul)

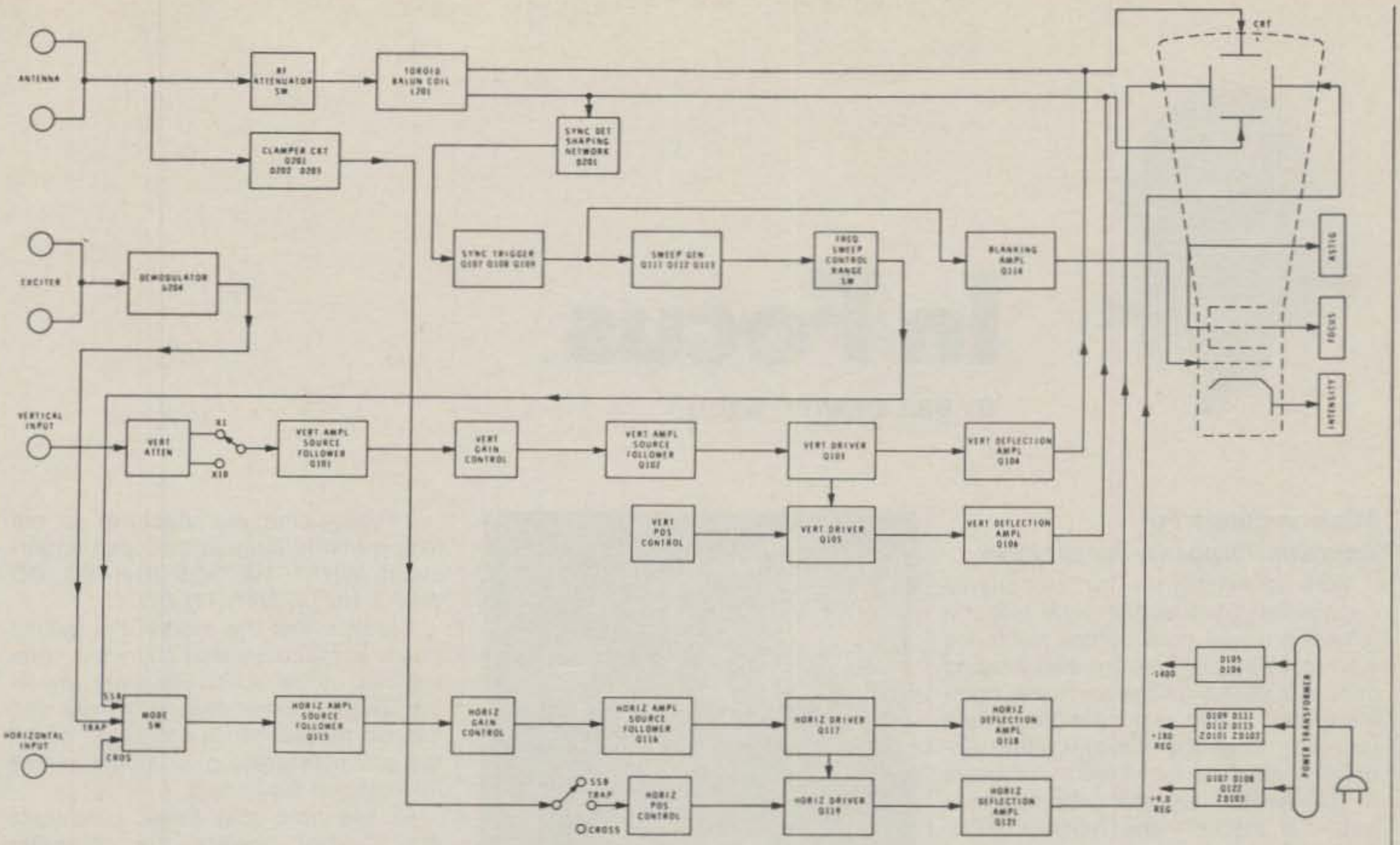


Fig. 1—Block diagram of the Heathkit SB-614 Station Monitor.

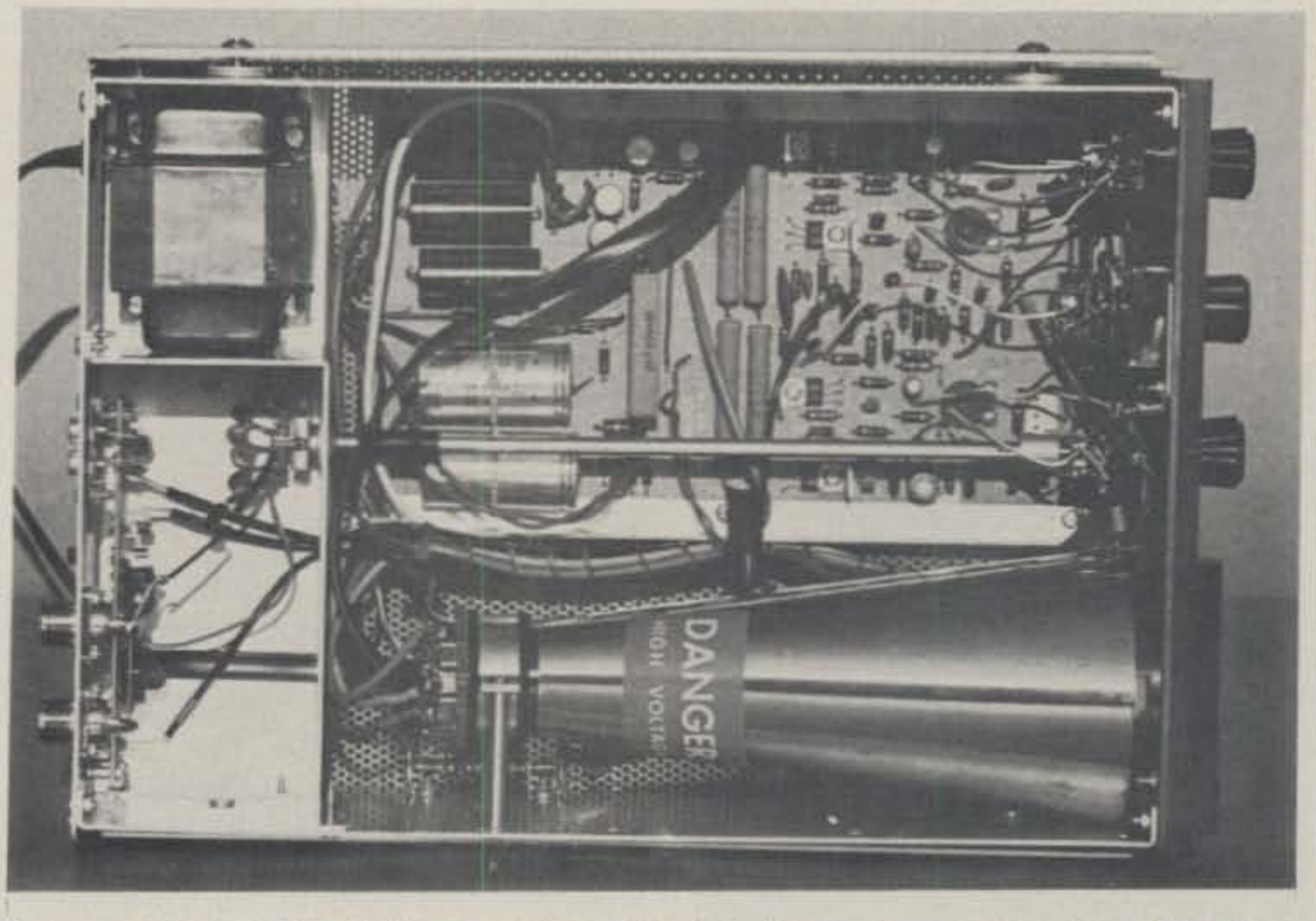
selecting the 10 kHz position and adjusting the variable sweep control, I was able to get a steady display of the complex video waveform. I was seeing a multiple display because of the low sweep frequency and the sync pulse was rounded off, but it was sufficient to trace the video and determine at what point I was losing it.

There are two standard coax connectors labeled Antenna and two phono type connectors labeled Exciter that can be observed in the photograph, at the back of the scope. Both sets of connectors are for looping the r.f. signal through the scope so that it may be sampled. The phono connectors supply r.f. to the demodulator board, which is mounted directly beneath them. The standard coax connectors supply r.f. through a variable attenuator, directly to the vertical deflection plates.

Three display modes may be selected by a switch on the front panel. In the s.s.b. mode, r.f. is supplied directly to the vertical plates and internal sweep is applied to the horizontal ampliler, resulting in an r.f. envelope display.

In the Trapezoid mode, linearity of the power amplifier may be checked by looping the exciter output through the connectors supplying the demodulator circuit, resulting in audio being applied to the horizontal amplifier. The output of the power ampli-

(continued on page 94)



Internal view of the station monitor showing the open construction. The four connectors described in the text are at the lower half of the rear panel on the left. (Photo by Sandra K. Paul)

In Focus

BY BILL DEWITT, W2DD

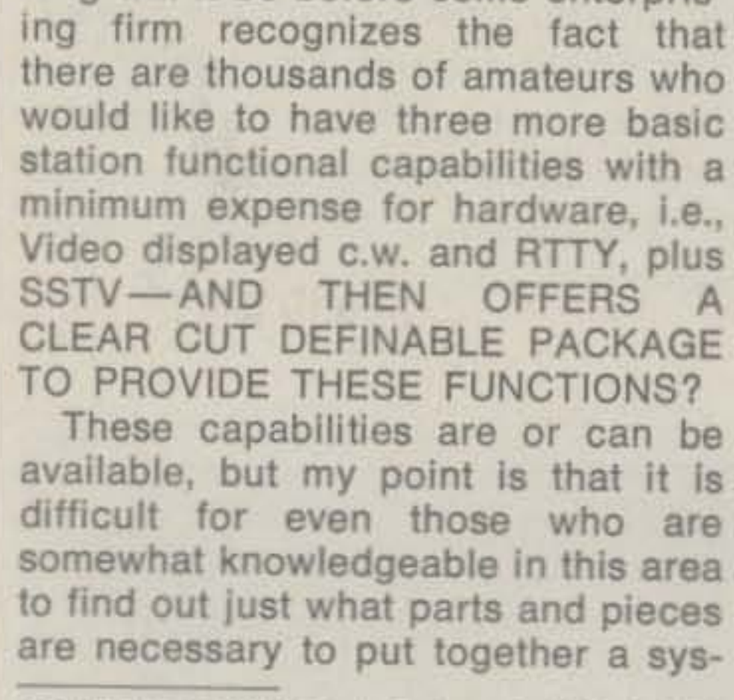
Minicomputers For Amateur Purposes, Perspective

With state of the art functional capabilities of minicomputers offering almost endless possibilities for those who understand the care and feeding of available hardware/software combinations, it seems to me that there is a glaring gap in the marketing approach used by many manufacturers in this field. They are overlooking a potential market—the NON-COMPUTER TYPE radio amateur market.

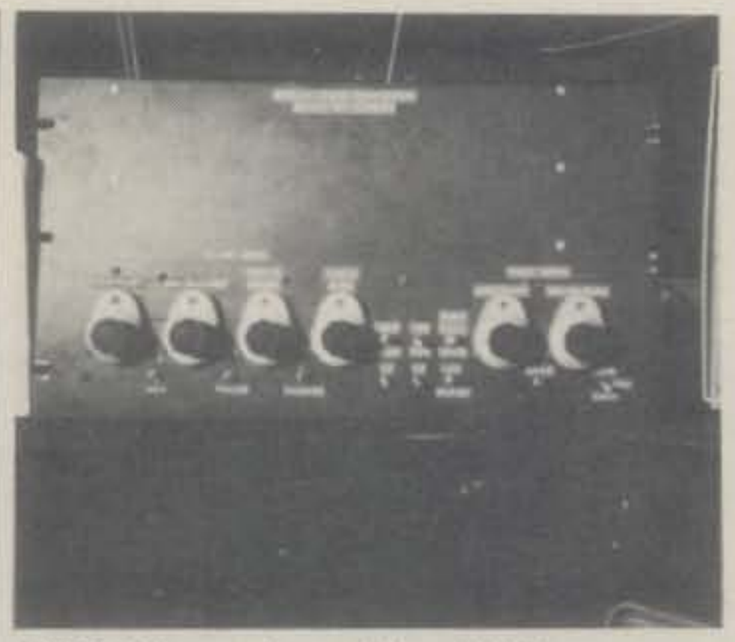
Minicomputers can be all things to all people, you might say, but how long will it be before some enterprising firm recognizes the fact that there are thousands of amateurs who would like to have three more basic station functional capabilities with a minimum expense for hardware, i.e., Video displayed c.w. and RTTY, plus SSTV—AND THEN OFFERS A CLEAR CUT DEFINABLE PACKAGE TO PROVIDE THESE FUNCTIONS?

These capabilities are or can be available, but my point is that it is difficult for even those who are somewhat knowledgeable in this area to find out just what parts and pieces are necessary to put together a system that will provide the extra functions just mentioned.

*2112 Turk Hill Road, Fairport, N.Y. 14450



Ron, VE3BSZ on mike at "Mission Control." Massive panels are left over from his days as a "Surplus" dealer.



VE3BSZ's version of the "LVI" scan converter. It's solid state and solidly built on a 19 inch rack panel.

We seem to be both blessed and plagued with the versatility of currently available computers. An amateur who hears that he can have computer generated c.w.-RTTY etc. finds it difficult to determine exactly what it is that he needs to make it all happen! This is the glaring gap in marketing mentioned earlier.

In the industrial field, for example, companies that wish to use a computer generally employ an applications expert who works with the computer manufacturer's tech rep to establish what hardware/software combination is needed to do the task of interest. BUT the potential (amateur radio) purchaser of computer gear has no applications engineer on tap, and he wants the manufacturer to say, "Look, here's what you need to fulfill your amateur requirements".

What Mr. Radio Amateur wants and will buy—is a minimum hardware computer and the software needed to add video-displayed c.w. and RTTY plus SSTV to his station capabilities. He does NOT feel a need for new ways to file his electric bills, recall names or locations, teach his kids geometry (even though this may be a built-in capability of a system).

I repeat, the manufacturer is not telling him in language he can understand WHAT HE NEEDS—TO DO WHAT HE WANTS TO DO.

I realize that the market I'm talking about is much smaller than the commercial/industrial/military etc. markets, but I believe that it is real and can be turned into a profitable one if the manufacturers give amateurs the information they need.

Please note that these comments are directed toward the computer system manufacturers and do not apply to the marketing/advertising efforts of companies making specific devices for specific purposes—such as Hal Communications Corp.'s RTTY/Morse gear, Robot's Model 300 Scan Converter, or Info Tech's Model 30 Morse to Video Converter, etc. The Digital Group hasn't done much advertising so far, but I presume that they will indeed make it clear to amateurs what they need for multi-function operation.

V (versatile) E (energetic) 3BSZ, A Can-Do Canadian Slow Scanner

Fifteen years ago, at the age of 16, Ron Cramer, VE3BSZ, of Port Colborne, Ontario, Canada, became one of Canada's youngest licensed amateurs. Now, Ron operates one of the best known slow scan stations on the North American continent with an

With the exception of the excavation and masonry work, VE3BSZ did all of the construction on his 36 ft. by 90 ft. ranch style home.

Dave Wilke, W3LSG, looks more like a Hollywood star than a slow scan aficionado!

array of home-brewed SSTV gear that reflects tremendous effort and a depth of knowledge.

Ron's knowledge of radio probably had some influence on his assignments as a Teletype Operator and later as a Radar Systems Technician during a hitch in the Canadian Army.

After hearing that Ron was for a time in the two-way radio business, then selling surplus gear, currently owns a 26 acre farm, a homebuilt airplane business, pilots his own plane, designed and built his home, and is in the custom plastics injection molding business—I somehow got the feeling that I've been swapping SSTV pictures with a Renaissance Man!

Ron's family are known as the "Flying Cramers". There are five licensed pilots in the family (including a sister). Ron has a 2000 ft. runway on his farm, and there are usually about six aircraft to be found there. With three homebuilt airplanes to his credit, Ron also enjoys rebuilding and re-designing aircraft.

Ron spends so much time IN THE AIR that it's a mystery how he finds time to get ON THE AIR! But he does, and I can testify that his WB9LVI designed scan converter does a fine job. Ron calls his nifty console set-up "Mission Control", and it looks the part! Not shown in the photos is a camera Ron uses in just about every QSO to put out PICTURES.

In the accompanying photographs, you can see Ron at "Mission Control" with a keyboard (YES, that's a homebrewed LMD) just below his hand; a nice close-up of his scan converter; and the home he designed and built. Incidentally, it's 36 ft. wide by 90 ft. long! Thanks to Ron's wife for the picture of Ron at the console.

Anyone who can accomplish all that Ron has by the age of 31 has my profound admiration. There s an old saying that if you want to get a job DONE, ask a busy man to do it. Ron, there are a few things on my "Honey-do" list—when you can spare the time!

News From Newfoundland

Bob Engelbrecht, VO1BL reports another VO1 active on slow scan. G. D. LeDrew, VO1ET, has joined Bob and M. Mercer, VO1FR, on SSTV just recently.

VO1BL's boards for his LVI scan converter have been checked out by that busy fellow I just mentioned, VE3BSZ, so by the time you read this, I'm sure that Bob will be enjoying the bright, complete pictures on a big B & W monitor. We need a picture of you and your new machine Bob!

Beautiful equipment lay-out and exotic wallpaper make W3LSG's shack an attractive spot.

Pennsylvania Powerhouse, W3LSG Of York, Pa.

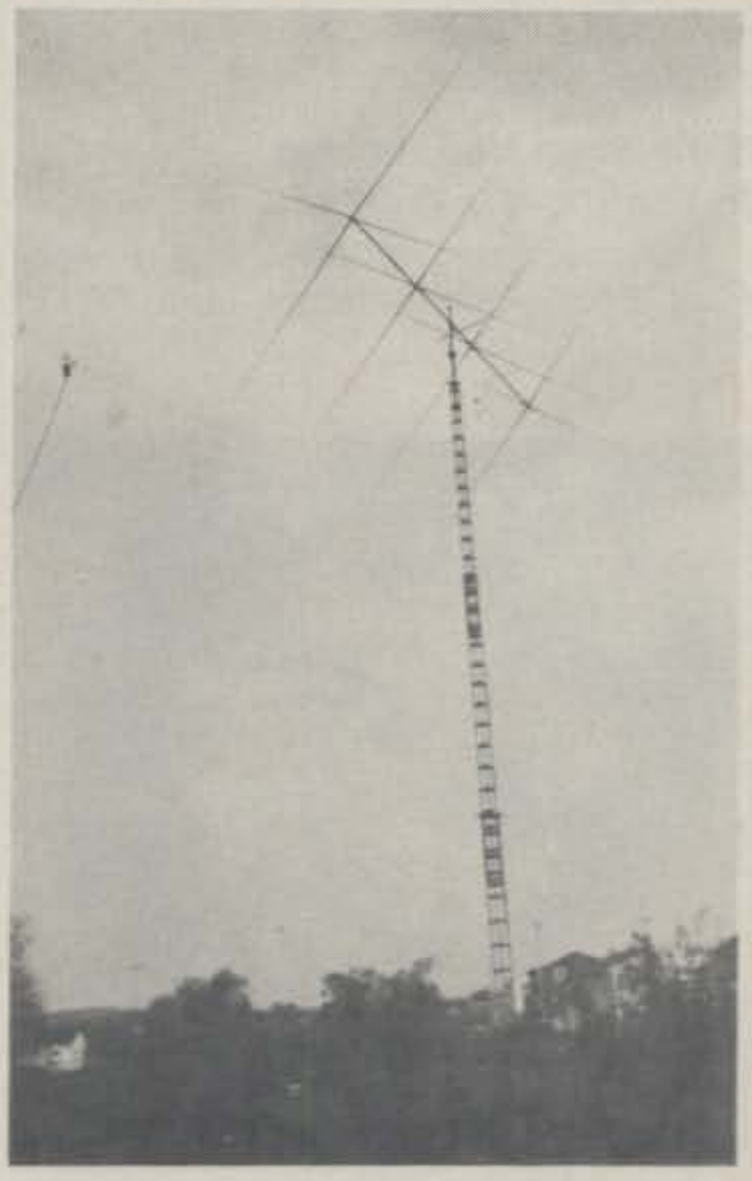
From Dave Wilke, W3LSG of York, Pa., I recently received three excellent photos showing Dave, his shack (?) (!), and his antenna/tower combination. That four element quad has now been converted to a FIVE element job, and believe me, that's the sort of thing that gives me a feeling of inferiority. (Me, with my little-old three element Yagi, and 200 feet of feed-line that has been buried for the last twenty years!)

Dave has been trying to run down the details on the commercial teletype station that monopolizes 14230 kHz most of the time. He has contacted the FCC, the ARRL, and sundry individuals in his efforts, but so far, reports no success. If anyone has definite information on this intruder, please notify the FCC (or your equivalent) immediately and request action to get it out of the band.

The question in my mind is, "How can anyone anywhere read teletype through K4QPR and W4MS on that frequency?" Hi!!

Bon Homme Richard, G3WW, Reporting From Wimblington

Take a good look at the neat scan converter and two off-the-monitor photos demonstrating the fine quality images it produces shown in the pictures sent to me recently by Richard



Eat your heart out, those four elements now have a fifth companion atop W3LSG's lofty tower!

G3GGJ constructed this neat "LVI" scan converter for G3WW. (See note about the Peto Scott 8 inch fast scan monitor in column text.)

Thurlow, G3WW. In Richard's opinion, the image quality obtained with his converter is not topped by the Robot 300. Lacking a controlled laboratory type comparison, quantitative comparisons are impossible, but anyone can see that G3WW's gear is indeed doing a fine job, with a minimum of pattern or structuring effects.

Howard Waton, G3GGJ, built the WB9LVI - designed converter for G3WW. The converter is housed in a Heath SB-220 case. Congratulations to G3GGJ on his top-notch workmanship.

Another prized possession of Richard's is an 8 inch Peto Scott TV monitor with automatic sensing of 405 lines, 50 Hz., 625 lines, 50 Hz., and 525 lines, 60 Hz. Sounds like something every European slow scanner should have!

Slow Scan Happenings In The UK, Via G3WW

Ron Johnson, G3GRJ again won First Prize for his home built SSTV gear (third year running!), in the Tel. Post Office Telecom. Employees Annual Hobbies Exhibition. His entry was a beautifully constructed WB9LVI scan converter with Vera boards.

Three more amateurs in the UK are going the "LVI" route! G8MNQ is reported to have completed a "simplified" version. GM3KJF has already completed several W3GKW boards and is collecting components for the rest. G3TKR who MADE HIS OWN BOARDS for the "LVI" design has nearly finished his converter. WOW!

More Via G3WW— A Non-Keyboard-Keyboard

When is a keyboard not a keyboard? When it doesn't have any keys! G8HBR, Mike Cook, of Whitfield, Manchester has recently demonstrated a "keyboard" featuring a new design concept. Instead of typewriter-like keys, it uses a double-sided printed circuit board. The back is filled with a diode matrix. Letters are "typed" by touching appropriate points on the front with a p probe (like a Biro pen). An interesting concept, and certainly an approach that minimizes the total hardware. How about a photo and more details Mike?

256 Line Video Anyone?

For information on how to modify your Venus SS-2 or W6MXV monitor for 256 line operation, see the article by Peter Burnett, G4BLL, elsewhere in this issue.

Echoes From Dayton And Along The Scan Conversion Trail

I wonder if large groups of amateurs all over the world have ever before undertaken a complex technical project such as the construction of the scan converter described in Dr. George Steber's landmark articles in *QST* last year.

Although a number of those who have replicated Dr. Steber's design made their own boards in one form or another, the greatest impetus to large scale involvement (probably 70/90 units built) derives from the dedicated effort of three extremely capable individuals.

Ed Arvonio, W3LY, Tony Pessiki, W3GKW, and Phil Rothsing, are the fellows who turned an overwhelming technical challenge into an outstanding engineering success by designing and making available PC boards to handle all features of Dr. Steber's design plus added features of great merit.

I'm sorry to say that I don't have a photo of Phil Rothsing for In Focus readers at this time, but for a look at Dr. Steber, Tony Pessiki, and Ed Arvonio at Dayton, please see the accompanying pictures. Thanks to Tony for the photos of himself with WB9LVI, and the "shot" of W4MS.

G3WW demonstrates eye detail from portrait. (Also via SSTV camera at very close range.)

As W3LY indicated in his remarks at Dayton, a number of amateurs were most helpful in working out some of the bugs encountered during the early stages of this project. Rather than risk an omission attributable to my poor note-taking, let me just add my "Well done!" to those of others who have seen and admired the results of a great team effort.

Rules For "Albatross SSTV Contest"

1st Albatross SSTV Contest

September 4th and 5th, 1976

Sponsors: B.A.T.C. (British Amateur Television Club) and A.E.C. (Advance Electronic s.r.l.) San Lazzaro (Bologna) Italy.

In order to promote increased interest in the SSTV mode of operation 14LCF has pleasure in announcing

Portrait of YV5GU's XYL as seen on fast scan monitor via Robot 80A camera and G3WW's scan converter.

One of slow scan's best known operators, Eddie Collins, really enjoyed all of the demonstrations at Dayton. That's W3GKW's gear in operation next to "Bride Clyde's" spouse.

Two prime movers in today's scan conversion revolution. Dr. George Steber, WB9LVI, and Tony Pessiki, W3GKW, had a lot to talk about at Dayton!

the 1st ALBATROSS SSTV CONTEST. Sponsors of this Contest are the B.A.T.C. British Amateur Television Club and the Italian firm A.E.C. Advance Electronic s.r.l.—Via Repubblica San Lazzaro (Bologna) Italy

Rules

Period Of The Contest: Part 1—1500-2200 GMT on September 4th, 1976. Part 2—0700-1400 GMT on September 5th, 1976.
Bands: All the frequencies authorized within 3.5—7.0—14.0—21.0—28.0 MHz bands and via Oscar. Recommended frequencies are 3.754—7.040—14.230—21.340—28.670 (± 5kHz).
Messages: Messages consist of: Exchange of pictures with a) Callsign b) Report (RST) c) Serial number Example: I0XXX 599 001.
Exchange Points And Multipliers: a) Points—1 point for contact on 14 MHz, 5 points on 3.5—7.0—21—28 MHz, 15 points via Oscar.
b) Multipliers—10 points for each continents (max 60 p.) 5 points for each country (ARRL list) W areas from W0 to W9 and VE from VE0 to VE7 will be considered as separate countries.
Scoring: Total exchange points multiplied by the multiplier total.
Sections: a) Transmitting and receiving video stations
b) Receiving video only
A separate table will be made for each class.

The new Robot Model 400 Scan Converter. It is completely solid state and provides 128 line video with 16 shades of gray for 8 second intervals. This new unit begins a phase of operations for Robot.

Logs: The Logs Will contain: Date—Time GMT—Band—Call sign received—Report (RST) and number sent and received—Points—Multiplier and final score.
A description of the station and photos would be appreciated but this is not obligatory. Logs must be received not later than OCTOBER 2nd 1976. *Send Logs to:* Prof. Franco Fanti, Via Dallolio n 19, BOLOGNA (Italy). Do *NOT* send them to W2DD.
Prizes: OMs: 1st The entrant with the highest score will receive an SSTV Converter from the firm A.E.C. Advance Electronics s.r.l. Of San Lazzaro (Bologna) Italy.
2nd One years subscription to *CQ-TV*
3rd One years subscription to *CQ-TV*
s.w.l.s Awards.

Logs received will not be returned. The "Contest Disqualification Criteria" of the ARRL are valid for this Contest. The decision of the organiser will be final and any subsequent controversy cannot be referred to the Civil Court. Include with the Logs 1 Dollar or the equivalent in the local money. This will be used to send the final score and the rules of the next competition.

More On Albatross SSTV Contest

With a scan converter as first prize, it would seem that this contest will evoke some very spirited competition. Be sure to keep an accurate log!

If you are trying to run up a higher score on 2×SSTV countries worked, here's your chance. It'll be interesting to see just how many "countries" are involved in this new and exciting competition. Let's all get in there and make this contest a big success!

Yes, In Focus will have Final Scores and further details of the Contest when available.

What's New Department.

Robot goes digital! Now that IS news. Robot Research of San Diego, CA. have just announced their new Model 400 Scan Converter priced at $695. The new unit is an all-solid state digital job which provides 128 line video with 16 shades of gray for 8 second slow scan transmissions. Received pictures can be viewed in sequence or individual frames "frozen" on the screen of a conventional B and W TV monitor. The 400 is approximately the same height and depth as the 300, but is only about 12 inches wide. See accompanying photo.

Robot's decision to "go digital" was based on the rapidly dropping prices of memory and the many other IC chips needed for the scan conversion process.

W3LY's demonstration of his scan converter was a highlight of the Friday night SSTV Seminar at Dayton. Ed is shown here making those "final touch" adjustments as the session got under way.

The 70 series monitors, 80 series cameras, the Model 61 "Fast Scan" monitor, and the Model 300 Scan Converter will no longer be manufactured by Robot.

More details and information next month.

Final-Final

As always, I appreciate your letters and comments. Please keep on sending notes and photos to me, they are the lifeblood of this column! Same old address, 2112 Turk Hill Road, Fairport, N.Y. 14450.

73, Bill, W2DD

Changing QTH?

Moving is often exciting, hectic and confusing. It's packing, shipping, saying goodbye to friends and leaving them behind. Don't say goodbye to CQ and leave us behind for the new folks to read. Give us about 6 weeks notice and CQ will be there about the same time you get the last carton unpacked. You won't miss a single great issue.

Attach Current Mailing Label

New Address

Call

Name

Address

City

State

Zip Code

cut out, paste on post card and mail to:

CQ MAGAZINE
14 Vanderventer Avenue
Port Washington, N.Y. 11050

Notes on Modifying the Venus SS2 and W6MXV Monitors to Receive 256 Line Video

BY PETER BURNETT* G4BLL

The new standards introduced by Robot are:
No. of Lines: 256 (128 × 2)
Line Frequency: 7.5 Hz. (15/2)
Frame Rate: 34 secs. (8.5 × 4)
The sync. pulse duration remains unaltered. The figures in brackets show how the new standards are derived from the original 128 line standard.

The Venus Monitor

From the figures given above it can be seen that the line *period* is increased by a factor of 2 and the frame by 4. Therefore it is simply necessary to increase the time constants in the scanning circuits by the same factors. In practice, if the printed circuit board tracks are not to be interfered with, it means increasing the values of C_{16} and C_{36} to approx. 400 mf and 2 mf respectively. The complete circuit for the modification is shown in fig. 1. which enables changeover between the two standards as desired.

It will be necessary to try several values of capacitors to obtain correct frame scan as the marked values of high capacitance electrolytics can vary quite considerably from their actual values. Closer tolerance tantulum capacitors would be better, but at these high values and at 2025 v.d.c. they are very expensive components.

*319, Leeds Road, Nelson, Lancashire BB9 8rw England.

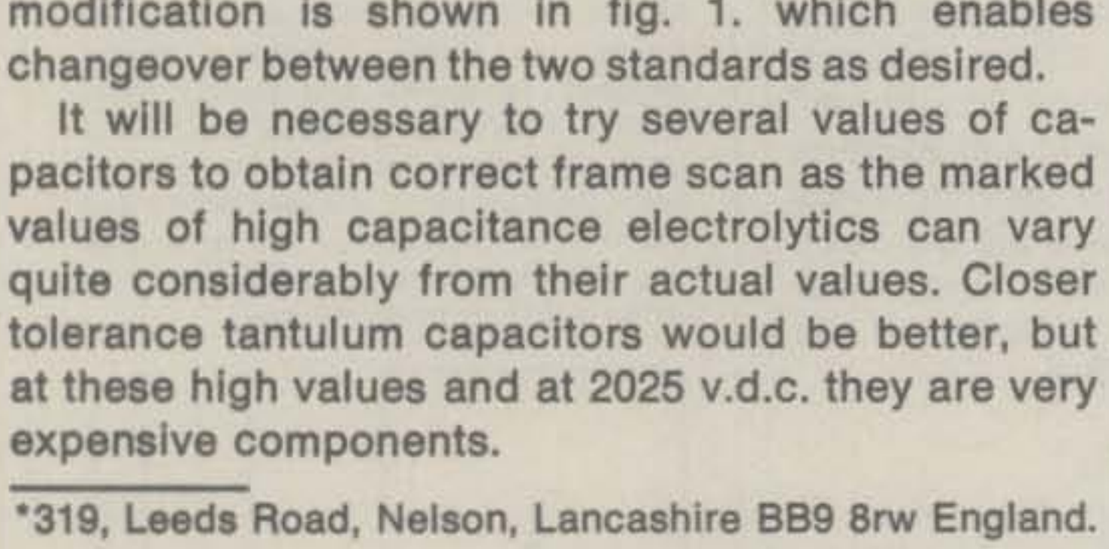


Fig. 1—The complete circuit for the modification of the Venus monitor.

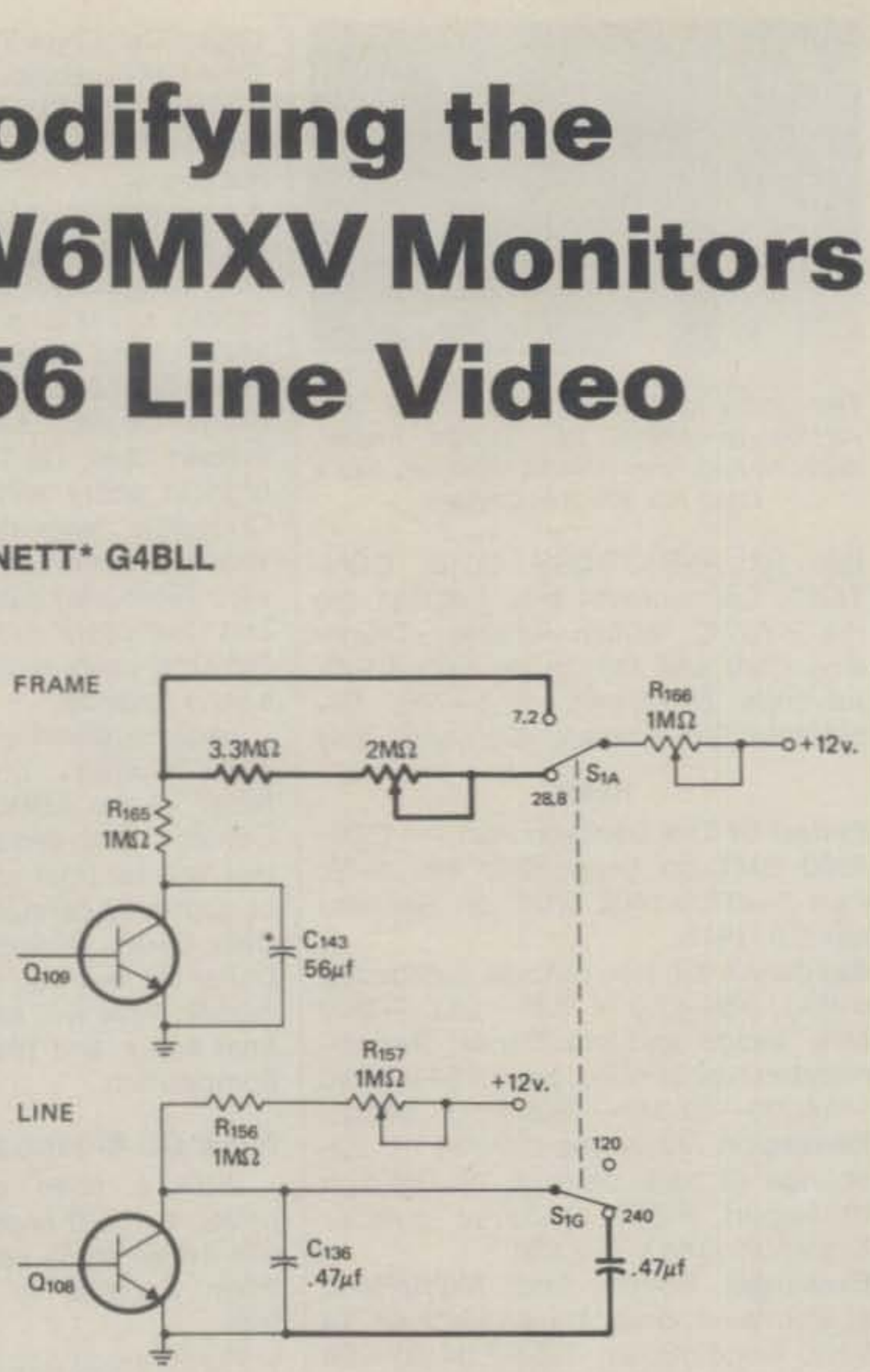


Fig. 2—Modifications to the W6MXV monitor.

The W6MXV Monitor

The scanning circuits are shown on page 85 of the *Slow Scan Television Handbook*. A further 0.47 mf capacitor is placed in parallel with C_{136} to increase the line period. But a better alternative to increasing the value of C_{143} for the frame is to place a 3.3M resistor plus a 2M variable in series with R_{165} and R_{166} as shown in fig. 2. The 2M pot. enables the frame rate to be set precisely. It was not thought necessary to modify the noise immunity circuits.

The question may be asked why bother with these modifications anyway?

An obvious disadvantage, of course, when viewing on a conventional long persistance tube is that the top of the picture is almost lost before the frame is completed. However it is considered that this is out weighed by the improved resolution or picture quality and the fact that a 256 line picture appears to exhibit an inbuilt immunity to noise and QRM. Pictures have been copied under conditions of QRM where it was impossible to copy 128 line video from the same station.

Why not carry out the modifications described here and judge for yourself! ■

1976 CQ World-Wide DX Contest

Phone: October 30-31 & C.W.: November 27-28

Starts 0000 GMT Sat. Ends 2400 GMT Sun.

I. OBJECTIVE: For amateurs around the world to contact other amateurs in as many zones and countries as possible.

II. BANDS: All bands, 1.8 thru 28 MHz.

III. TYPE OF COMPETITION: 1. Single Operator. Single Band & All Band.

2. Multi-Operator (all band operation only).

a. Single Transmitter, only one transmitter and one band permitted during the same time period (defined as 10 minutes). *Exception:* One—and only one—other band may be used during the same time period if—and only if—the station worked is a new multiplier.

b. Multi Transmitter (no limit to transmitters but only one signal per band permitted).

IV. NUMBER EXCHANGE: Phone: RS report plus zone (i.e.: 5705). C.W.: RST report plus zone (i.e.: 57905).

V. MULTIPLIER: Two types of multiplier will be used.

1. A multiplier of one (1) for each different zone contacted on each band.

2. A multiplier of one (1) for each different country contacted on each band.

Stations are permitted to contact their own country and zone for multiplier credit. The *CQ* Zone Map, DXCC country list, WAE country list and WAC boundaries are standards.

VI. POINTS: 1. Contacts between stations on different continents are worth three (3) points.

2. Contacts between stations on the same continent but different countries, one (1) point. *Exception:* For North American stations *only*, contacts between stations within the North American boundaries count two (2) points.

3. Contacts between stations in the same country are permitted for zone or country multiplier credit but have zero (0) point value.

VII. SCORING: All stations: the final score is the result of the total QSO points multiplied by the sum of your zone and country multiplier.

Example: 1000 QSO points × 100 multiplier (30 Zones + 70 Countries) = 100,000 (final score).

VIII. AWARDS: First place certificates will be awarded in each category listed under Sec. III in every participating country and in each call area of the United States, Canada, Australia and Asiatic USSR.

All scores will be published. To be eligible for an award a Single Operator station must show a minimum of 12 hours of operation. Multi-operator stations must operate a minimum of 24 hours. A single-band log is eligible for a single-band award *only*. If a log contains more than one band it will be judged as an all-band entry, unless specified otherwise.

In countries or sections where the returns justify, 2nd and 3rd place awards will be made.

All certificates will be issued to the licensee of the station used.

IX. TROPHIES & PLAQUES: Handsome trophy awards will be made to the highest scoring stations in the following categories.

Single Operator, All Band Trophy Donors

1. World—Phone *(Bill Leonard, W2SKE)*
2. World—C.W. *(Larry LeKashman, W2AB)*
3. USA—Phone *(Potomac Valley Radio Club)*
4. USA—C.W. *(Frankford Radio Club)*
5. Canada—Phone *(Jack Baldwin, VE3BS)*
6. Europe—Phone *(W4BVV Operators)*
7. Europe—C.W. *(W3AU Operators)*
8. Carib./C.A.—Phone *(Don Wallace, W6AM)*
9. Carib./C.A.—C.W. *(Don Wallace, W6AM)*
10. Africa—Phone *(Gordon Marshall, W6RR)*
11. Africa—C.W. *(Gordon Marshall, W6RR)*
12. Asia—Phone *(Japan CQ Magazine)*
13. Asia—C.W. *(Japan CQ Magazine)*
14. Oceania—Phone *(N. Calif. DX Club)*
15. Oceania—C.W. *(Maui A.R.C.)*

Single Operator, Single Band Trophy Donors

16. World—Phone *(K2HLB Memorial Trophy—N. Jersey DX Assn.)*
17. World—C.W. *(W2JT Memorial Trophy — N. Jersey DX Assn.)*
18. Canada—Phone *(Gene Krehbiel, VE7KB)*
19. Carib./C.A.—Phone *(Pedro Piza, Jr., KP4AST)*
20. S. America—Phone *(Brazil DXers)*
21. Europe—14 MHz C.W. *(G2LB Memorial Trophy —From his friends)*
22. USA—Phone *(S. Calif. DX Club)*
23. USA—C.W. *(N. Ill. DX Club)*

Multi-Operator, Single Trans. Trophy Donors

24. World—Phone *(John Knight, W6YY)*
25. World—C.W. *(Anthony Susen, W3AOH)*
26. Canada—Phone *(Calgary A.R.A.)*

Multi-Operator, Multi-Trans. Donors

27. World—Phone *(Radio Club Venezolano)*
28. World—C.W. *(Hazard Reeves, K2GL)*

Contest Expedition Trophy Donors

29. World—Phone *(Stuart Meyer, W2GHK)*
30. World—C.W. *(K2HLB Memorial Trophy—Don Miller, W9WNV)*

Trophy winners may win the same trophy only

CQ World Wide DX Contest CQ

Last Full Weekend of October (Phone) & November (CW)

Page 9 of 15 Pages

Call Sign W1MDO ☐ Phone ☒ CW Log for 21 MC Band

(use separate log for each band)

DATE GMT	TIME GMT	STATION	SERIAL NUMBER SENT	SERIAL NUMBER RECEIVED	INDICATE MULTIPLIERS ONLY ZONE	INDICATE MULTIPLIERS ONLY COUNTRY	QSO POINTS	
	1405	G3HCT	58906	57914	14	G	3	
	08	DL9PF	579	58914		DL	3	
	11	DM2NTD	579	57914		DM	3	
	20	UB5WF	599	59916	16	UB5	3	
	23	W1WY	599	59905	05	W		0
	25	G4RJ	569	57914			3	
	32	OH8RC	579	59915	15	OH	3	
	40	VE5US	599	59904	04	VE		2
	45	DLØWK	589	58914			3	
	47	YO8DD	579	57920	20	YO	3	
	1500	4Z4HF	589	58920		4X4	3	
	2215	WA6GLD	599	59903	03			0
	17	KV4FZ	599	59908	08	KV4		2
	19	YV5BPJ	599	59909	09	YV	3	
	28	W4WSF	589	58904				0
	31	KH6IJ	589	59931	31	KH6	3	
	46	JA8MM	569	57925	25	JA	3	
	48	JA3WCZ	579	56925			3	
	52	JH1RCJ	579	57925			3	
	2300	KL7MF	589	57901	01	KL7		2
	1315	OH2BM	579	58915			3	
	17	HB9AG	579	58914		HB9	3	
	24	UA3DZ	579	57916		UA3	3	
	29	4Z4HF	589	57920		DUPE		0
	32	63FXB	599	59914			3	
	1600	PJ6CC	599	59909		PJ	3	
	05	ZD3A	589	58925	35	ZD3	3	
	17	CR6CA	579	59936	36	CR6	3	
	1820	F9FF	579	57919		F	3	
	22	KV4FZ	599	59908		DUPE		0
	28	DX2TA	579	57914			3	
	32	OX1JA	579	58940	40	OX		2
	35	TF2WFZ	589	58938	38	TF	3	
	50	ZS5OU	599	57925		ZS5	3	
	2130	JA5SZ	579	58925			3	
	35	JA3WCZ	569	58926		DUPE		0
	38	JA9MF	569	57925			3	
	2200	VK2EO	589	58930	30	VK	3	
	24	KA2AB	599	57926			3	
	58	VS6DO	569	57924	24	VS6	3	
		37 QSO's (minus duplicates)		TOTALS (This Page Only)	18 (Zones)	25 (Countries)	98 (Points)	

Note: Duplicate QSO's can mean disqualification!

CQ Form 1057A 1969

A sample log page.

Year 1975

CQ World Wide DX Contest CQ

Last Full Weekend of October (Phone) & November (CW)

Call Sign W6DGH U.S.A. Country

Single Operator: ☒ Phone ☐ CW ☐ Single Band ☒ All Band

Multi-Operator (All Band Only): ☐ Single Transmitter ☐ Multi-Transmitter

	QSO's (minus duplicates)		QSO Points		Zone Multiplier		Country Multiplier		Score	
1.8 mc	1	→	0	×	1	+	1	=		1.8 mc
3.5 mc	46	→	116	×	19	+	30	=		3.5 mc
7.0 mc	49	→	130	×	18	+	23	=		7.0 mc
14 mc	164	→	458	×	33	+	67	=		14 mc
21 mc	578	→	1714	×	31	+	69	=		21 mc
28 mc	175	→	495	×	27	+	59	=		28 mc
All Bands	1013	→	2913	×	129	+	249	=	1,101,114	All Bands

How to score: QSO Points × (Zones + Countries) = FINAL SCORE

EXAMPLE: 1000 QSO Points × (30 Zones + 70 Countries) = 100,000 points

Station Description KWS-1 75A-3

Antenna(s) 2 el. 40, 4el. 20, 7el. 15, 5el. 10, Dipoles 80, 160; 2el. Quad 10-15-20

Operators

Remarks (Biggest thrill in Contest, funniest story, comments, etc.) Report sent 5903; Received 5925 unless otherwise noted.

Club Competition (Minimum 3 logs) Southern California DX Club

This is to certify that in this contest I have operated my transmitter within the limitations of my license and have observed fully the rules and regulations of the contest.

Type or Print (Signature) Richard J Norton

Name Richard J. Norton Call W6DGH

Address 21290 West Hillside Drive

City Topanga

State or Country California (Zip) 90290

Logs must be postmarked no later than December 1st for PHONE and January 15th for CW. Indicate PHONE or CW on envelope.

Mail to: CQ Contest Committee 14 Vanderventer Ave. Port Washington, N.Y., U.S.A. 11050

Note: Duplicate QSO's can mean disqualification!

CQ Form 1057A 1969

A sample summary sheet.

once within a three year period. (This does not apply to any of the *CQ* plaque awards).

The Canadian, Carib./C.A. and the African awards are for residents *only*.

X. CLUB COMPETITION: *CQ* will award a handsome plaque to the club submitting the highest aggregate score of the phone and c.w. scores submitted by its members.

1. The club must be a local group and not a national organization.

2. Participation is limited to members operating within a local geographic area, (except for DX-peditions especially organized for operation in the contest and manned by members.)

3. To be listed, a minimum of 3 logs must be received from a club and an officer of the club must submit a list of participating members and their scores, both on phone and c.w.

XI. LOG INSTRUCTIONS: 1. All times must be in GMT.

2. Indicate zone and country multiplier only the FIRST TIME it is worked on each band.

3. Logs must be checked for duplicate contacts, correct QSO points and multipliers, and recopied logs must be in their original form with corrections clearly shown.

4. Use a separate sheet for each band.

5. Each entry must be accompanied by a Summary Sheet showing all scoring information, category of competition, contestant's name and address in BLOCK LETTERS and a signed declaration that all contest rules and regulations for amateur radio in the country of operation have been observed.

6. Official log and summary sheets and zone maps are available from *CQ*. A *large* self-addressed envelope with sufficient postage or IRC's must accompany your request.

If official forms are not available, make up your own by following the samples shown, 40 contacts to the page on 8½"x11" paper.

XII. DISQUALIFICATION: Violation of amateur radio regulations in the country of the contestant, or the rules of the contest, unsportsmanlike conduct; taking credit for excessive duplicate contacts; unverifiable QSO's or unverifiable multipliers will be deemed sufficient cause for disqualification. (Incorrectly logged calls will be counted as unverifiable contacts.)

Disqualification can also result in the disqualified operator(s) being barred from competition in all *CQ* contests for a period of up to three years.

Actions and decisions of the *CQ* Contest Committee are official and final.

XIII. DEADLINE: All entries must be postmarked NO LATER than December 1, 1976 for the Phone section and January 15, 1977 for the C.W. section. Indicate phone or c.w. on envelope. Logs go to:

CQ WW Contest Committee
14 Vanderventer Avenue
Port Washington, L.I., N.Y. USA 11050

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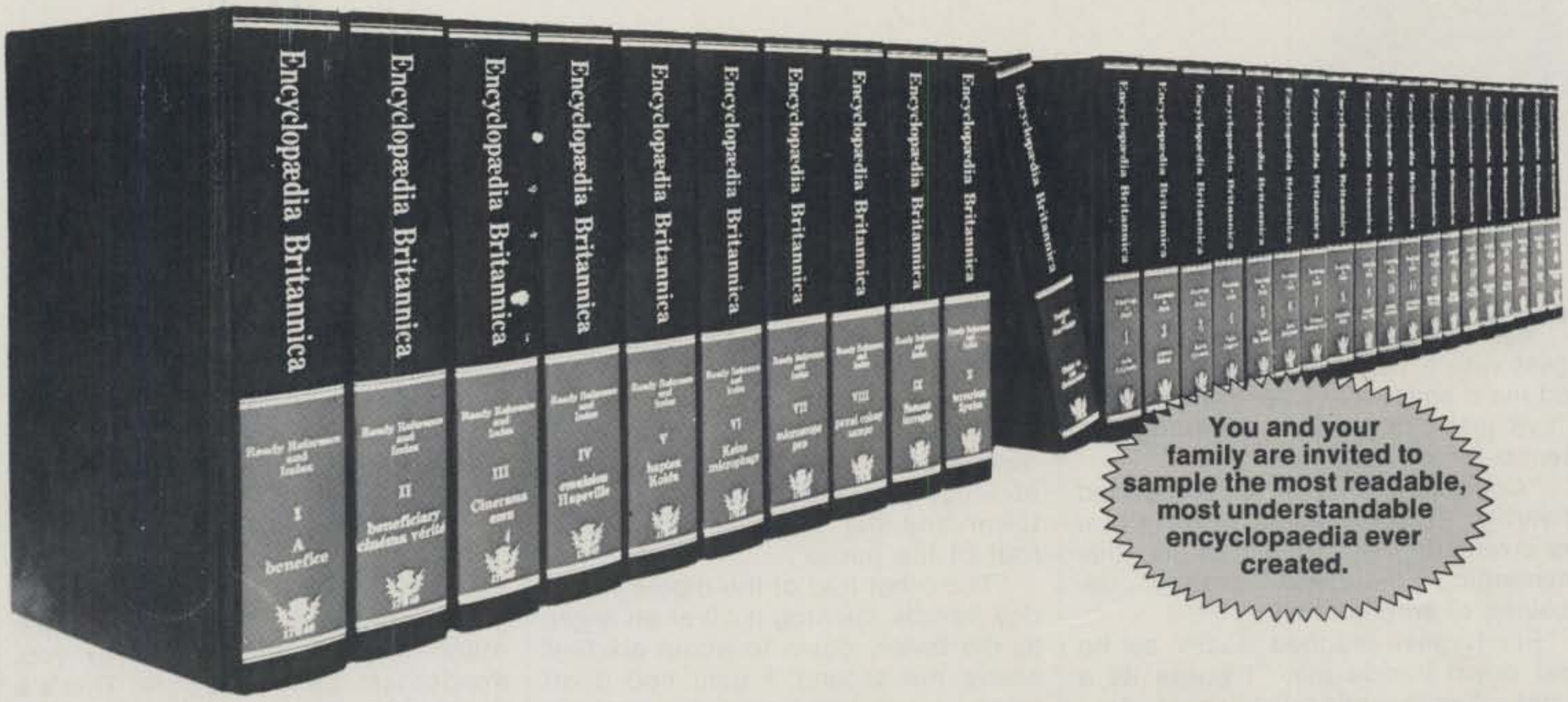

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WILLIAM I. ORR, W6SAI, ON

Antennas

"Congratulate me", said Pendergast with a happy smile as he handed me a sheet of yellow graph paper. "I've just designed an 80 meter antenna for my station".

"Congratulations!", I responded heartily. "Tell me about it. Have you re-invented the wheel, or is this something that will change the course of antenna history?"

Pendergast laughed easily as he sat down beside me. "I guess its a case of re-inventing the wheel. Anyway, you know the problem I have —not enough yard space for an 80 meter antenna. Its the old story—I've tried end-fed Marconi antennas, verticals and never really had much luck, so I decided to put up a full-size dipole".

"On your lot? You must be kidding. You just don't have the room to run it out".

"Agreed", replied my friend. "The longest stretch I have is just about sixty three feet. My tower for the triband beam is in one corner of the back yard, and all I have is a run of a little over sixty feet to the house. So guess what I did?"

"Tell me!", I pleaded.

Pendergast turned to his drawing (fig. 1). "I remember the luck some fellows have had with the *sloper* antenna, so I decided to make my dipole into a sloper. I cut the dipole for 3800 kHz, so it was 122 feet, overall. Half of the dipole, or 61 feet of wire, just fitted in between my tower and the TV mast next to the roof of the house.

"The other half of the dipole I bent downwards, running it off at an angle to the tower, down to about six feet above the ground. I then tied it off to the wood fence and ran it along the fence. At the far end, it was about three feet off the ground".

I said nothing, so Pendergast took a big breath and continued. "I figured that the high portion of the dipole would act as a radiator and maybe the folded-down section would act as a sloper. Then I fed the antenna with a balun in the normal manner. The top wire was just about 26 feet above ground."

"Well, how did it work?", I asked, looking closely at the drawing.

"Great!", enthused my friend." Look at the s.w.r. plot (fig. 2). The bandwidth is somewhat less than that of a normal dipole, but the antenna provides over 100 kHz bandwidth between the 2-to-1 s.w.r. points. And I've had plenty of contacts . . . nothing spectacular, because it has only been up for a few days. But plenty of stations out to 1200 miles or thereabouts, with good reports. And I'm only using my transceiver barefoot".

"The dipole is a very forgiving antenna", I remarked. "This shows that you can actually use half of it as a sort of radial ground wire, and the other half will do the job for you. Pendergast, I like your style. That's a good antenna, and probably has a lot less loss than an equivalent Marconi antenna".

Pendergast blushed with pleasure.

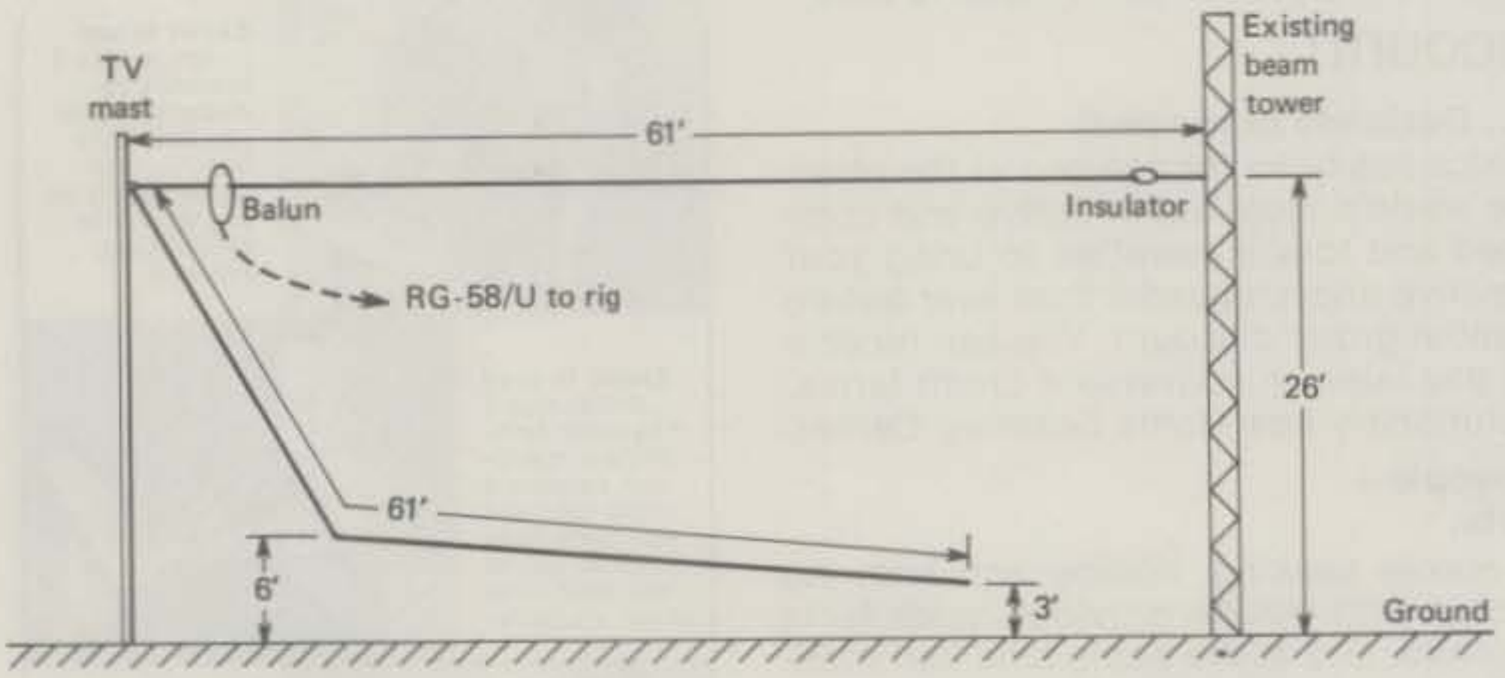

Fig. 1—The "Pendergast" version of the sloper antenna for 80 meters. The dipole is 122 feet overall, cut for 3800 kHz. One 61 foot section is horizontal and about 26 feet above ground. The other portion of the dipole serves as a "radial wire" and runs down towards the ground, at an angle from the mast. About six feet above the ground, it is tied off to a wood fence and runs along the fence for the remainder of the length. The dipole is fed with a 1-to-1 balun and a random length of 50 ohm coax line.

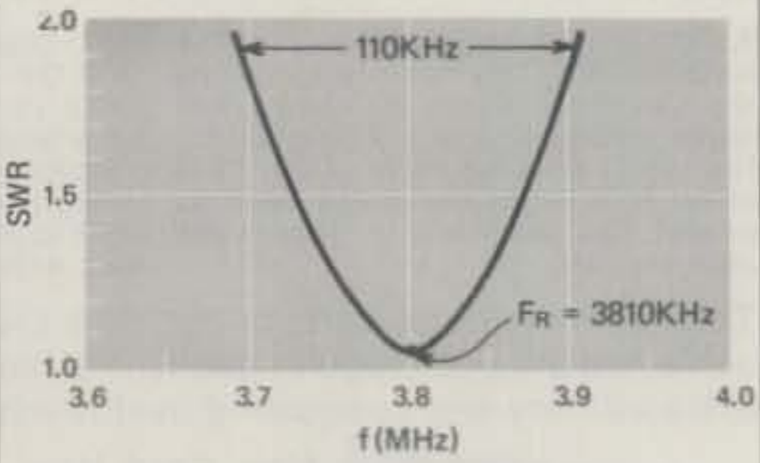

Fig. 2—The s.w.r. plot of the dipole of fig. 1. An operational bandwidth of over 100 kHz between the 2-to-1 s.w.r. points is achieved about the design frequency of 3.8 MHz. Bandwidth would probably be better if the "radial wire" was run off in the opposite direction to the flat top. Antenna also works well on 10 meters, providing an s.w.r. of less than 1.4-to-1 from 28.5 MHz to 29.0 MHz.

*48 Campbell Lane, Menlo Park, CA 94025.

"And guess what? It works on 10 meters as a center-fed long wire! The s.w.r. is below 1.4-to-1 from 28.5 MHz to 29.0 MHz. And I've worked all over the U.S. of A. on sporadic-E skip with this antenna. Two bands for the price of one!"

"Yes", I agreed. "The antenna works as a seven half-wavelengths wire on 10 meters. God knows what your radiation pattern looks like; it's probably a hash of both horizontal and vertical polarization. The point is, you have a simple, inexpensive and compact antenna that does the job on both 80 and 10 meters. I would imagine that you can vary the s.w.r. plot around by moving the lower wire with respect to ground. Some time you might try running the lower wire away from the upper one, just to see what happens. I think if you did that, you might improve the s.w.r. bandwidth on 80 meters".

Pendergast breathed a happy sigh and nodded his head. "Perhaps I'll do that next weekend. But things are working so well, it might be a good idea to leave well-enough alone".

"You aren't the only backyard experimenter", I remarked. "Look at this photo of Dave, W3LSG. He's got a four element, triband Quad on a crank-up tower. This is the *sixth* Quad he's built. Notice how he works on it. He drops the crank-up tower down and then climbs up to adjust the elements on a guyed extension ladder (fig. 3). That's a fine idea. He can clip onto the ladder with his safety belt and use both arms to work on the Quad. That looks like the safe and smart way of experimenting on one of these monster antennas".

"It is a good idea", agreed Pendergast. "I am a coward when I'm more than 20 feet in the air".

"And here are two more good antenna ideas from that avid experimenter, Mike, WA3GJA. He suggests using a *Hustler* mobile antenna as the top loading device to make a vertical antenna for 80 and 40 meters (fig. 4). The basic antenna is a 40 meter ground plane made of aluminum TV mast sections. It has four 40 meter radials at the base, strung out over the grass. It also has four 80 meter radials, plus a six foot ground rod.

"At the top of the 40 meter radiator the 80 meter *Hustler* resonator is mounted on a ⅜ × 24 stud. The mobile whip above the resonator is adjusted to provide resonance at the desired frequency in the 80 meter band."

"Isn't this antenna quite sharp on 80 meters?", asked Pendergast.

"Probably", I replied. "It should be broad enough to cover the whole 40 meter band, but I would think that the passband on 80 meters is limited to about 50 kHz. That's not bad, however, for an antenna of this size".

"What's the other antenna?", asked Pendergast, as he made notes in his ever-present lab notebook.

"Mike's other antenna is also designed around a slip-up TV mast. It is a double inverted-V for 80 and 40 meters. The mast serves as a support for the center of the antenna and the wires of the inverted-Vs serve as guy wires for the mast. The inverted-V dipoles are connected in parallel at the top feed point and fed with a single 50 ohm transmission line of RG-58/U cable. Since both Vs are full-size dipoles, bandwidth is good on both 40 and 80 meters."

"How about a tri-band antenna that's simple and easy to erect?", asked my friend. "Something that takes up a minimum of space?"

"Well, my old friend WA7LRU came up with an interesting antenna", I replied. "Bill wanted a compact triband antenna and he designed the

Fig. 3—Here's how Dave, W3LSG works on his four element Quad. The tower retracts to the 20 foot level and Dave makes his adjustments from the top of a guyed 20 foot extension ladder. He clips onto the ladder with a safety belt so he can use both arms to work on the antenna.

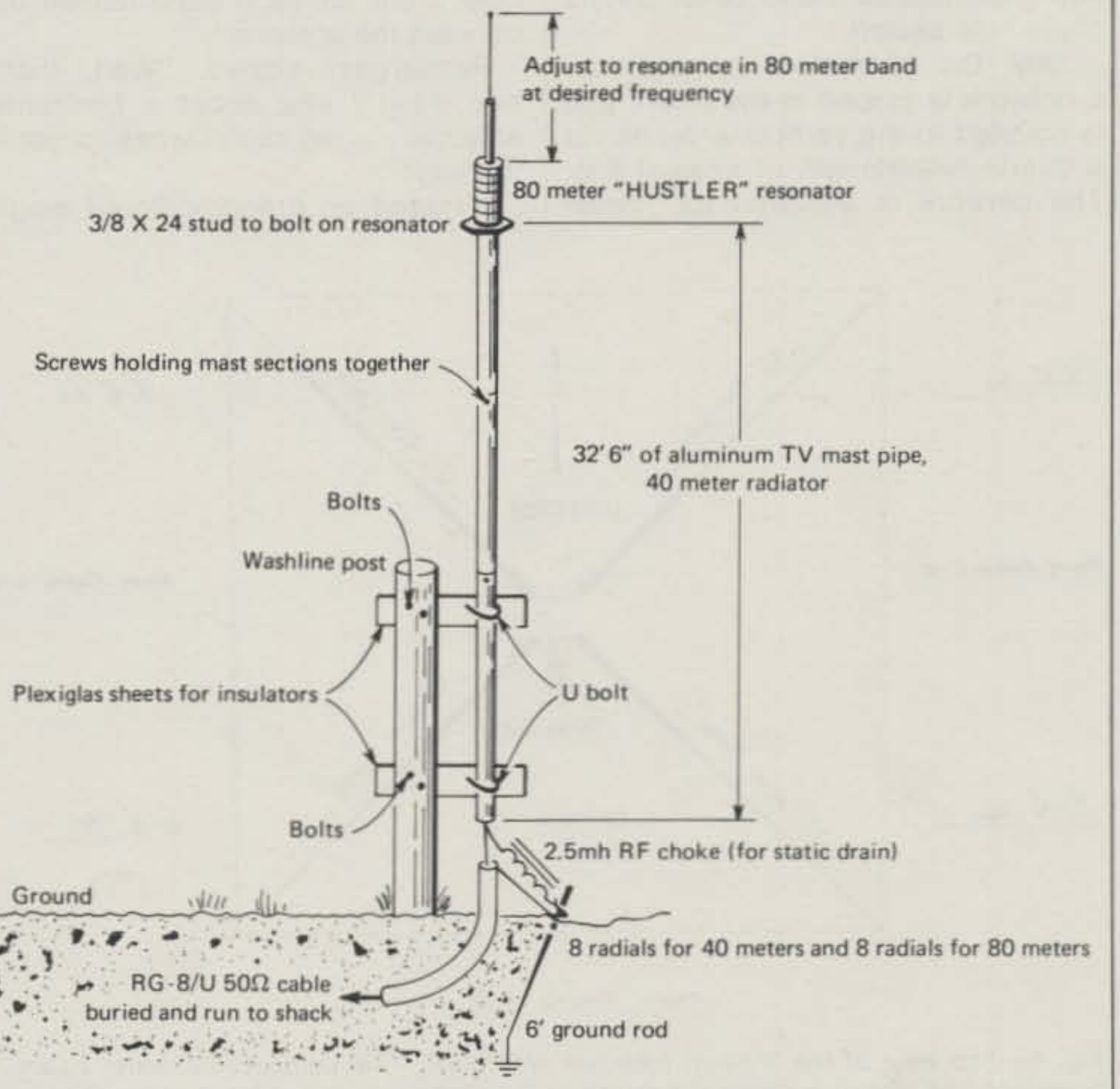

Fig. 4—The WA3GJA vertical antenna for 40 and 80 meters is made of a Hustler mobile whip mounted atop a 40 meter ground plane. The resonator and top section are adjusted for resonance at the operating frequency in the 80 meter band. Separate radials for 80 and 40 meters, plus a ground rod, are placed at the base of the vertical. An r.f. choke is placed across the coaxial line at the base of the antenna for a static drain.

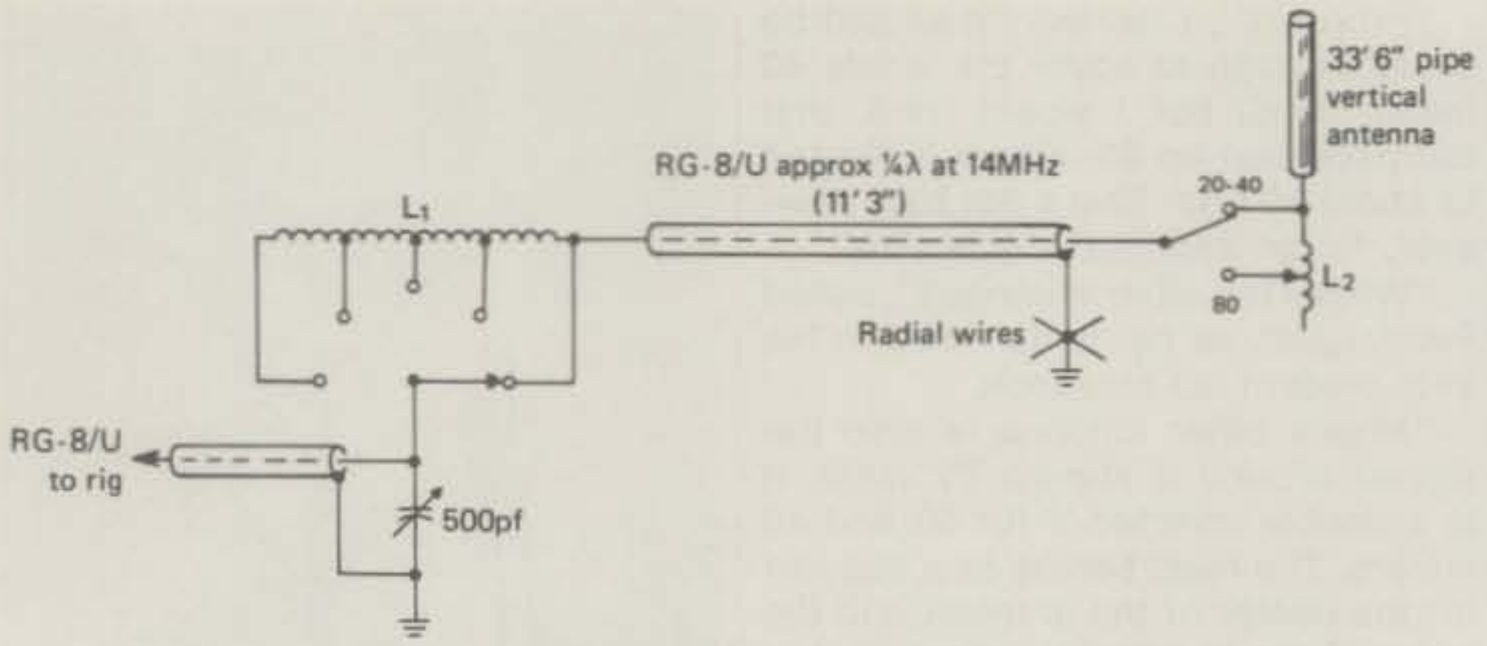

Fig. 5—The 80-40-20 meter vertical antenna of WA7LRU. Antenna acts as a ground plane on 40 meters, with L_2 out of the circuit. On 80 meters, antenna is base loaded by coil L_1. On 20 meters, antenna is a half-wave vertical, fed through a quarter-wave matching transformer made of 50 ohm line. Simple L-network matches transformer to 50 ohm line. Network is in the shack and the loading coil is at the base of the antenna. Coils are surplus roller coils and capacitor is double spaced. Radials for the three bands are placed under the antenna.

one shown in fig. 5. It consists of a 34 foot self-supporting vertical made of aluminum tubing. It has radials for 80, 40 and 20 meters at the base—the more radials, the better.

"On 40 meters, the antenna functions as a simple ground plane. On 80 meters, a base loading coil is used to resonate the system to the desired frequency. Bandwidth on 80 meters, of course, is rather narrow—about 25kHz. However, the base loading coil is adjustable, so the antenna can be resonated anywhere in the 80 meter band.

"Well, how about 20 meter operation", demanded Pendergast as he copied the sketch.

"Ah! On 20 meters an auxiliary L-network is placed in the shack and is coupled to the vertical antenna via a quarter-wavelength of coaxial line. The network is adjusted for lowest s.w.r. on the transmission line to the equipment. The line running from the network to the antenna, of course, has quite a high s.w.r. on it—it acts as an impedance transformer. And it does the job.

"Bill has the loading coil switch at the base of the antenna connected to a long extension shaft that pierces the shack wall, so he can switch between the three bands without leaving his operating position.

"And don't forget, with this vertical antenna, or any other vertical, part of the secret of success is to use plenty of radial wires. Bill has at least eight for each band fanned out beneath the antenna".

Pendergast sighed. "Well, that's one thing I *like* about a horizontal antenna . . . no radial wires to get in the way!"

I tossed an orange-colored magazine at my friend. "Say, if you like horizontal antennas, you'll love the *X-Beam* designed by VK2SK and described in the February, 1976 issue of *amateur radio,* the publication of the *Wireless Institute of Australia.* This is a compact, 2 element 20 meter beam that fits within a square less than nineteen feet on a side. Fig. 6 is a top view of the beam. This is a boomless design and, according to VK2SK, the power gain compares favorably with the usual tri-band 3 element beam. You can see why he calls it the X-beam. A driven element and director are used with both elements affixed to a common center piece by means of insulating clamps.

"Each element is split in half at the center to form four arms, the length of each arm being 13 feet. VK2SK suggests the use of ¾-inch, ⅝-inch and ½-inch tubing to make up the arms. The arms droop about a foot at the tips unless a vertical center post is used, with nylon fishing line stays out to the element tips to take up the sag.

"Since the antenna elements are only 26 feet long, it is necessary to add wire "tails" to the element tips to bring them to the proper length. The tails are made up of #24 copper wire and are tied back upon each other by nylon fishing line. Finally, the director element is jumpered at the center and the driven element is fed at the center with a 50 ohm coaxial line. VK2SK passed the line down the inside of his steel mast and brought it out at the base. He concluded that no balun was needed at the antenna end of the line, since the line was shielded by the mast.

"The length of the tails is relative to wire size and the length given applies only to #24 wire. Changing wire size means that the tails must be retrimmed for best performance."

"How do you tune the X-Beam?", asked my friend.

"According to VK2SK, the tails on the director are adjusted for best front-to-back ratio and the tails on the driven element are adjusted for

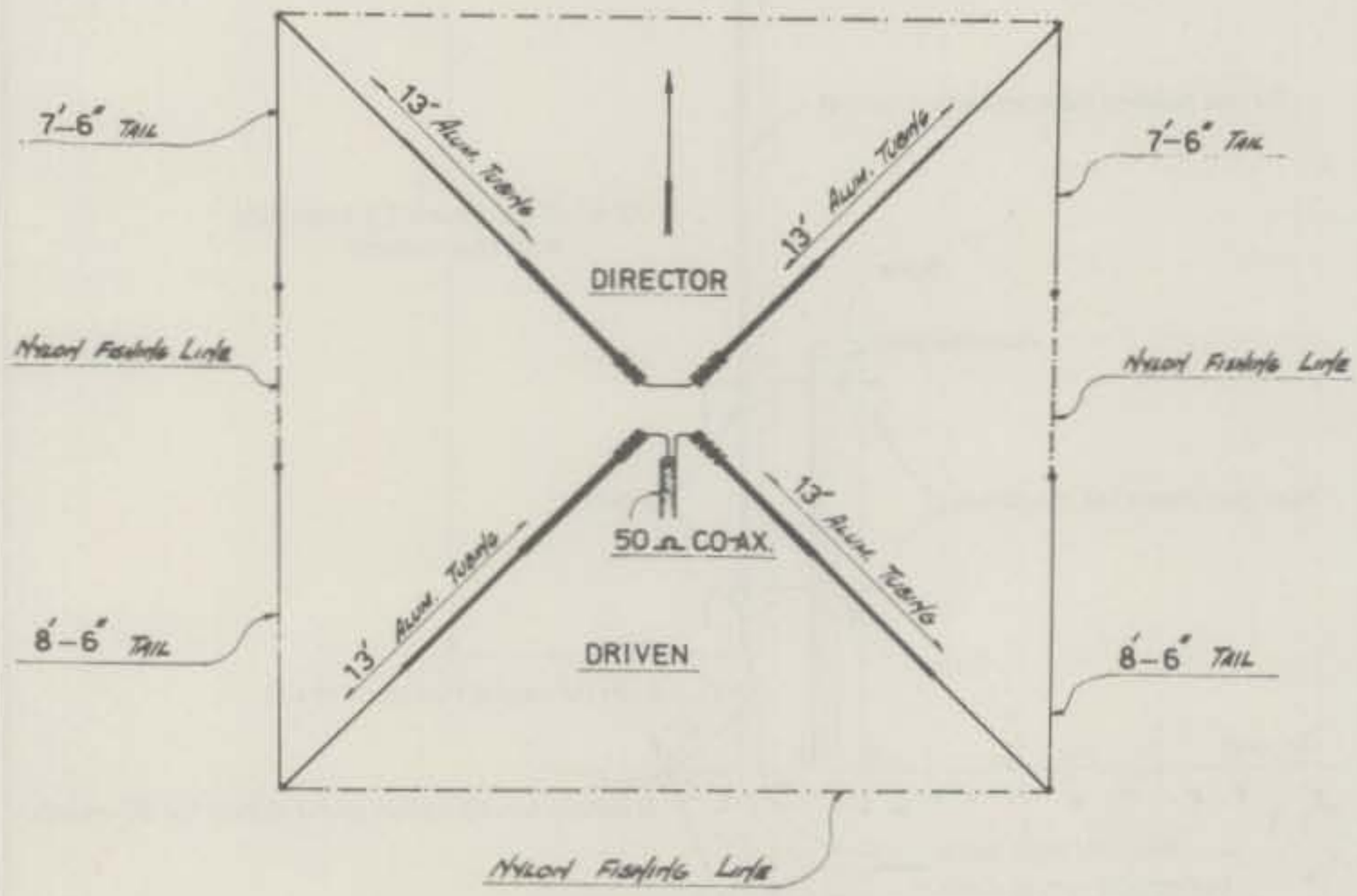

Fig. 6—Top view of the X-beam installed at VK2SK. This compact 20 meter beam is boomless, the elements being supported at the center on an insulated plate. Each arm is 13 feet long. The director sections are connected together at the center, and the driven element is split and fed with a 50 ohm coaxial line. To achieve resonance, wire tops are added to the ends of the element to bring them to the proper length. The tips (or "tails") are folded back and tied to form a square. Nylon line is used to connect the tips together. (Drawing courtesy of amateur radio, *the publication of the Wireless Institute of Australia).*

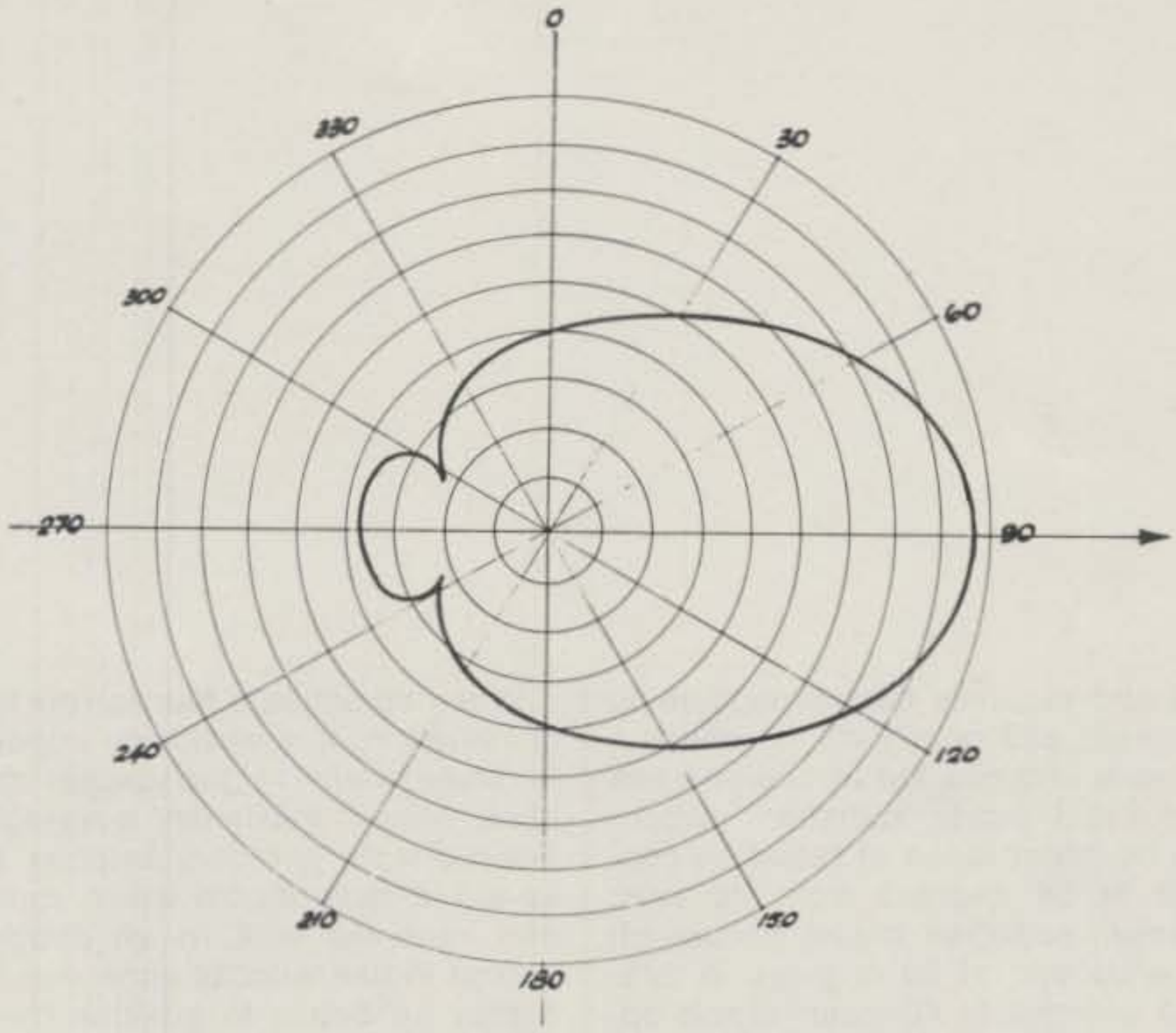

Fig. 7—The Polar pattern of the VK2SK X-beam, as plotted by ZL2NH.

lowest value of s.w.r. at the design frequency. He recommends that the tails be made longer than necessary and taped to the nylon line and folded back upon themselves. They can then be quickly pruned with cutters. Both elements are closely coupled and tuning one interacts with the other. As a result, the director is opened at the center and the driven element is then resonated to frequency. Once that is done, the director is adjusted for best performance".

"What kind of a pattern does the X-Beam have?", inquired Pendergast. He continued to draw in his notebook.

"A plot of the beam was run by ZL2NH, as shown in fig. 7. This is typical of a two or three element array. Obviously, the antenna works. And the results are very good for an assembly that only weighs about 4.5 pounds.

"Incidentally, you'll notice that the length of both elements is slightly longer than similar elements in a conventional Yagi beam. Extra-length elements are commonly required when the elements are folded back upon themselves, as is done in this design."

"Amazing", admitted Pendergast. "A 20 meter beam of this size and weight is certainly an eye-opener".

"An alternative design would be to eliminate the wire tails and extend the X-arms to their full length. You would have to adjust the lengths to compensate for the design change.", I said.

"How good is the bandwidth of the X-array?", demanded Pendergast.

"According to the article in *amateur radio*, the bandwidth is better than 2-to-1 across the 20 meter band. That's quite good for an array of this size and configuration".

Pendergast sighed and glanced at his digital wristwatch which gave the time, date, temperature and humidity. "Getting late", he said. "Nearly time

(Continued on page 89)

Fig. 8—CB antenna hardware provides inexpensive antenna mount for amateurs. The Turner type 800 mirror mount for CB whip doubles handily as a support for amateur whip. Device bolts to any horizontal pipe-like structure. An ideal arrangement for portable operation from a hotel or motel having a fire escape rail, porch railing or the like. Mount has a standard SO-239 receptacle.

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Novice

BY HERBERT S. BRIER, W9EGQ

What Direction Is It There From Here?

Can you point accurately to the north, east, or any other point of the compass from your location? Do you know the great-circle bearings (directions) from your location to various overseas points such as Germany, Australia, India, Japan, or other exotic points? The answers to these types of questions are important to amateurs when it comes time to erect almost any type of antenna. An exception is a simple vertical antenna that theoretically radiates and receives equally well in all directions (but in no direction as well as other types in their best directions.)

Virtually all antennas, except the simple vertical, performs better in some directions than in others. The widely-used 1/2-wave horizontal or inverted-V dipole, for example, radiates and receives best broadside to its length and poorly off its ends. A full-wave antenna fed at one end has a four-leaf clover radiation pattern with its major lobes of radiation centered at 54 degrees from its axis; minimum radiation (nulls) occurs off the ends and at 90 degrees. A 3/2-wave antenna (a 40-meter dipole operated on 15 meters) in turn has major lobes at 48 degrees, a minor lobe at 90 degrees and nulls off the ends and between the lobes.

As an antenna is lengthened in multiples of a 1/2-wavelength, its major lobes become narrower and swing closer to its axis. Thus, one eight to 10 wavelengths long (approximately 450 feet at 15 meters) exhibits fair gain in the direction of its major lobes about 20 degrees off its axis, but the antenna must be carefully positioned; so that a major lobe of radiation, rather than a null, covers the area of interest.

When an antenna has narrow lobes of radiation, it is obviously important to steer them in the proper directions. When maximum coverage is desired from a broad antenna such as a 1/2-wave dipole which radiates and receives well in all directions except in line with its ends, however, it may be better to position the antenna to place the nulls in areas of minor interest, because the nulls are much sharper than the maximums. In most areas of the United States, 80- and 40-meter dipoles running north and south may be preferable to dipoles running east and west. On the other hand, an operator in Florida might well decide to erect his dipole with its ends northeast and southwest in order to shift its nulls into lightly populated areas. If you decide to play the null-shifting game, remember the nulls are sharp; therefore swinging the ends of a dipole a few feet may be enough to move a null to a less-damaging area. The game is easy to play with inverted-V antennas, the ends of which are often close enough to the ground to be easily reached.

The wall-to-wall, 20-meter (count them) station of Larry H. Kleber, K9LKA, Belidere, Ill., will be finished any time now. At least that is what Larry has been saying for 50 years. Even in its unfinished state, it puts out the type of signals Novices dream of.

Establishing Directions

The first step in positioning an antenna is to establish true north from your location. If you have any doubts about where north is, ask the local highway department which directions the streets near your location run. A surveyor who establishes property boundaries for banks and real estate agents or sighting the North Star on a clear night are other possibilities. The next step is to learn the true great-circle bearings (directions) between your location and remote points. A flat map of the world constructed on the mercator projection shows Australia southeast of the United States, Japan and India west, and Europe slightly north of east. A world globe, however, reveals that Australia (Sydney) is slightly south of west (250 degrees), Japan is north-

*409 So. 14th St., Chesterton, Ind. 46304.

west (315 degrees), India (Calcutta) is north (5 degrees), and Europe (Berlin) is slightly north of northeast (35 degrees).

You may consult an azimuthal map centered on a city near you instead of a world globe to determine bearings to remote points. The maps are often available from large book stores or department stores. Also, the ARRL 30 × 40" (72 × 92 cm) Radio Amateur's DX Map is centered on Wichita, Kansas. It has the country prefixes as well as the country names printed on the map, and the bearings from Wichita are printed on the perimeter. The information on bearings and distances on azimuthal maps is adequate for amateur purposes at points within 200 miles of the center point. But at locations 500 to 1000 miles from the center point some errors in indicated bearings may be greater than 30 degrees.

Other aids in determining great circle bearings are two tables, "Great Circle Bearings to Various Worldwide Metropolitan Areas" and "Great Circle Bearings in The United States" in the U.S. edition of the *Radio Amateur Call Book Magazine,* published by Radio Amateur Callbook, Inc., 295 Sherwood Drive, Lake Bluff, Ill. 60044. The "Radio Amateur DX Guide," published by the same firm contains other bearing charts, maps, and other information useful to amateurs.

New Novice Licensing Program Being Tested

In May, the Federal Communications Commission approved on a one-year experimental basis an ARRL-suggested program to cut the time that elapses between the time a new Novice starts to study for the examination and his license is finally received. In the program, carefully screened groups are authorized to conduct Novice License Study Courses, administer and grade examinations, and inform the FCC who are qualified for a Novice license. The FCC will then issue the license without delay. About 25 ARRL-affiliated Amateur Radio clubs are the bellwhethers of the new program. Starting in June, they have been conducting study courses consisting of 10 or 12, 2-hour lessons preparatory to administering the tests and turning the names of the successful students over to the FCC, which will be monitoring the program closely to see that no "hanky-panky" develops.

Although the new program was suggested and developed by the American Radio Relay League, Inc., the Federal Communications Commission stresses that all other qualified organizations are eligible to participate. Also, it is absolutely not necessary to use ARRL-prepared study material in the courses, and it is reliably reported that several other organizations are preparing their own materials.

Marilyn Backys, WN9TDR, 334 Firestone Drive, Hoffman Estates, Ill. 60195, works 40 meters using a Drake R-4C receiver and a Drake T-4XB transmitter, plus a 40-meter dipole. A new Dentron vertical is in the works for 80 meter work. Marilyn heads up the "Ways And Means" Committee of the Schaumburg Amateur Radio Club and also writes a column for the club paper. Her husband is K9UQN. We are awarding WN9TDR a 1-year subscription for CQ Magazine for her prize-winning entry in our Monthly Photo Contest. You are invited to try your luck by sending a clear picture (preferably "black and white") of yourself and amateur station and a few details about your radio experiences to: Photo Contest, c/o Herbert S. Brier, W9EGQ, Novice Editor, CQ, 409 So. 14th St., Chesterton, Ind. 46304. Suitable non-prize winners will be published as space permits.

News And Views

Copies of the new study guides for the Novice and Technician-Conditional-General Class licenses are available upon request from Amateur and Citizens Division, Federal Communications Commission, Washington, D.C. 20054. Specify which one you want . . . **Cliff Cheng, WN6JPA,** 133 So. Hayworth Ave., Los Angeles, Calif. 90048, is 15, a high school student, and a part-time salesman for Henry Radio. He operates 40 and 15 meters daily with a Drake T4XC transmitter and a Drake R4C receiver sharing time with a 15/40 meter dipole. He has worked 46 states, 34 verified. Cliff is apparently something of a "junk collector," too: his keyer is a Curtis EK-38 put together from "junk," and he has a Drake MN-2000 antenna coupler assembled in the same manner. Not getting enough amateur radio at home, Cliff also operates the 35-watt station at school.

If you would like to work Midway

(Continued on page 89)

NEW from NRI

Home training in AMATEUR RADIO

NRI, leader in Communications, Television, Electronics and TV-Radio home training, now offers the first in Amateur Radio courses, designed to prepare you for the FCC Amateur License you want or need.

Don't lose your favorite frequency

The FCC has said "either-or" on licensing, but to pass Advanced and Extra Class exams, you need the technical guidance as offered by NRI. NRI Advanced Amateur Radio is for the ham who already has a General, Conditional or Tech Class ticket. Basic Amateur Radio is for the beginner and includes transmitter, 3-band receiver, code practice equipment. Three training plans offered. Get all the facts. Mail coupon. No obligation. No salesman will call on you. NATIONAL RADIO INSTITUTE, Washington, D.C. 20016.

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ACCREDITED MEMBER NATIONAL HOME STUDY COUNCIL

Here's another version of a two meter vertical antenna. It's simple and easy to make. Elsewhere in this issue is another one. Build them both this weekend...experimenting with antennas is fun.

ANOTHER 5/8-WAVE ANTENNA FOR 2-METERS

BY BYRON H. KRETZMAN*, W2JTP

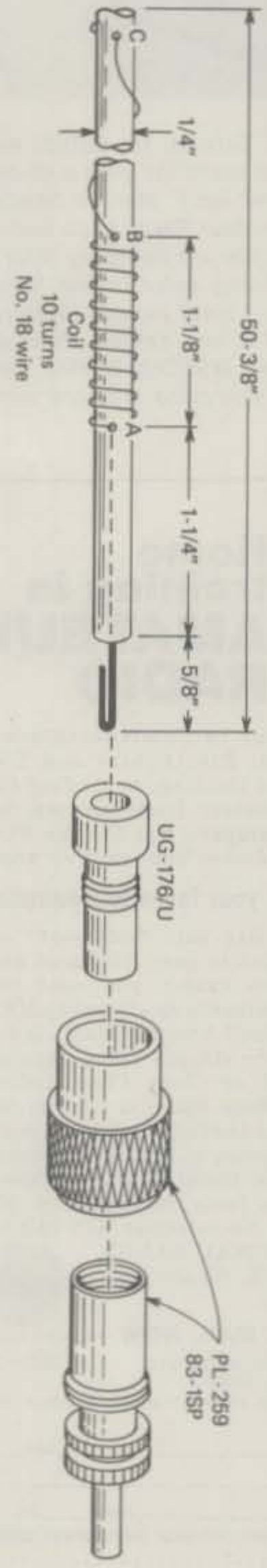


Fig. 1—An Exploded View of Antenna Assembly

In the past few years several ⅝-wave 2-meter antennas have been described in v.h.f. handbooks, [1]Brier, H. S., "A 5/8-Wave Vertical for 2," *CQ* Feb. '64, f.m. and repeater handbooks, and in the amateur radio magazines. Several commercial and several amateur antenna manufacturers have brought out versions of this popular antenna, and they are now widely used on f.m. Theoretically, its gain is about 2.5 db, but it appears to work much better than the previously more common ground plane or coaxial antenna. (We suspect that this is because of its lower angle of radiation.)

Now, we don't know who invented the ⅝-wave antenna, but to the best of our knowledge, the first description of an amateur ⅝-wave antenna for 2-meters was by Herb Brier W9EGQ[1] way back in 1964, before the rise of the rice box on f.m. Herb's antenna was quite simple, meaning easy to construct. Based on the proposition that there are still a few amateurs left who like to build something, we built another (we have had two up for over ten years) and laid out on paper detailed instructions to enable some of the local fellows to duplicate it. This article is therefore the story on those instructions. It should be noted, though, that our antenna is not that much different from Herb's; it's only more recent.

Construction

Our 2-meter ⅝-wave antenna was built around the common readily-available "u.h.f" coax cable male plug, the PL-259 (Amphenol 83-1SP). Also used was the equally common and available UG-176/U adapter used to adapt the PL-259 to the thinner RG-59/U cable. Fig. 1 shows an exploded view of the antenna proper. This assembly plugs into a standard SO-239 female chassis connector equipped with a UG-106/U hood. The chassis connector is mount-

*431 Woodbury Road, Huntington, N.Y. 11743

[1]Brier, H. S., "A 5/8-Wave Vertical for 2, *CQ* Feb. '64, pg. 45.

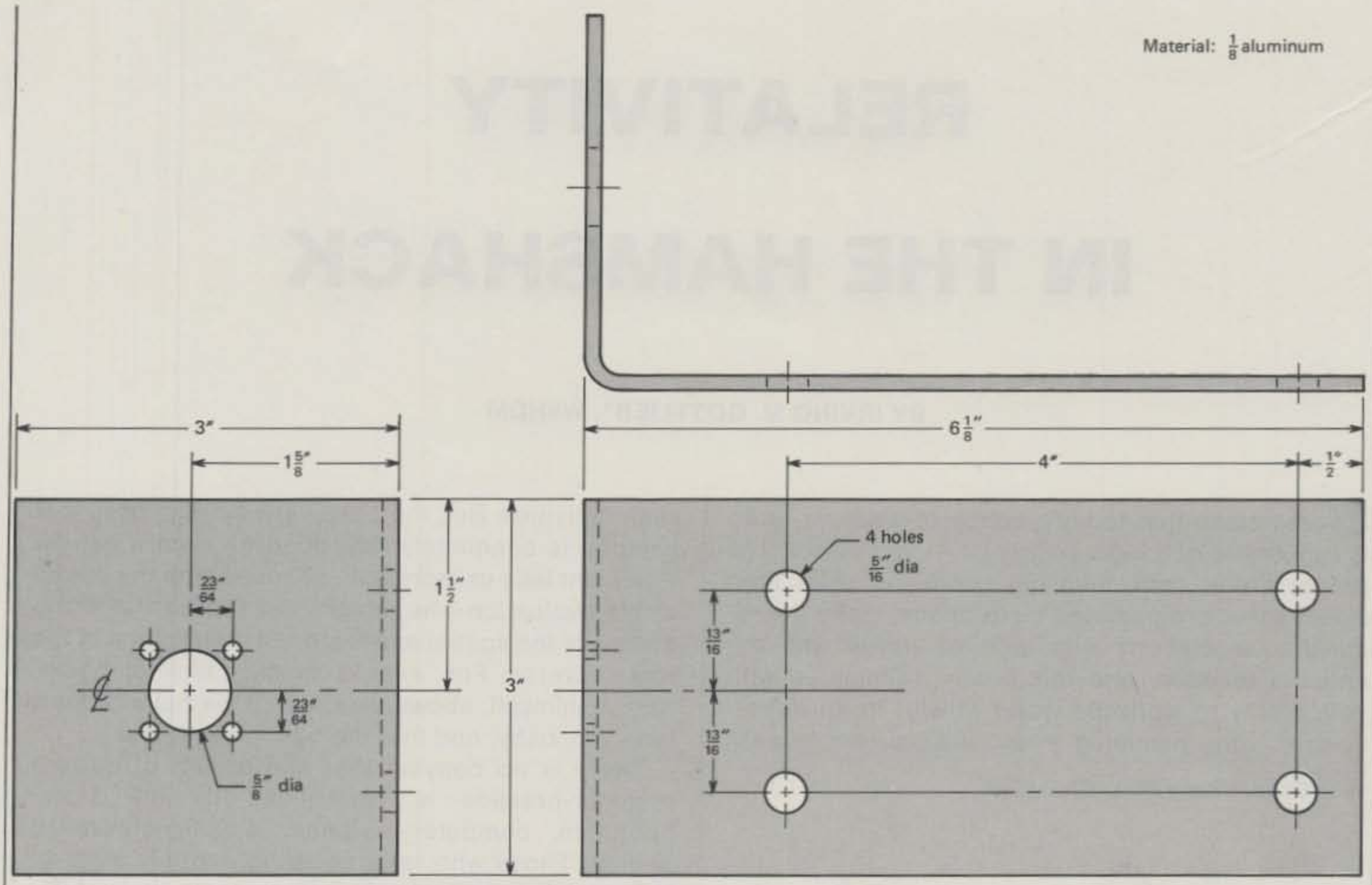


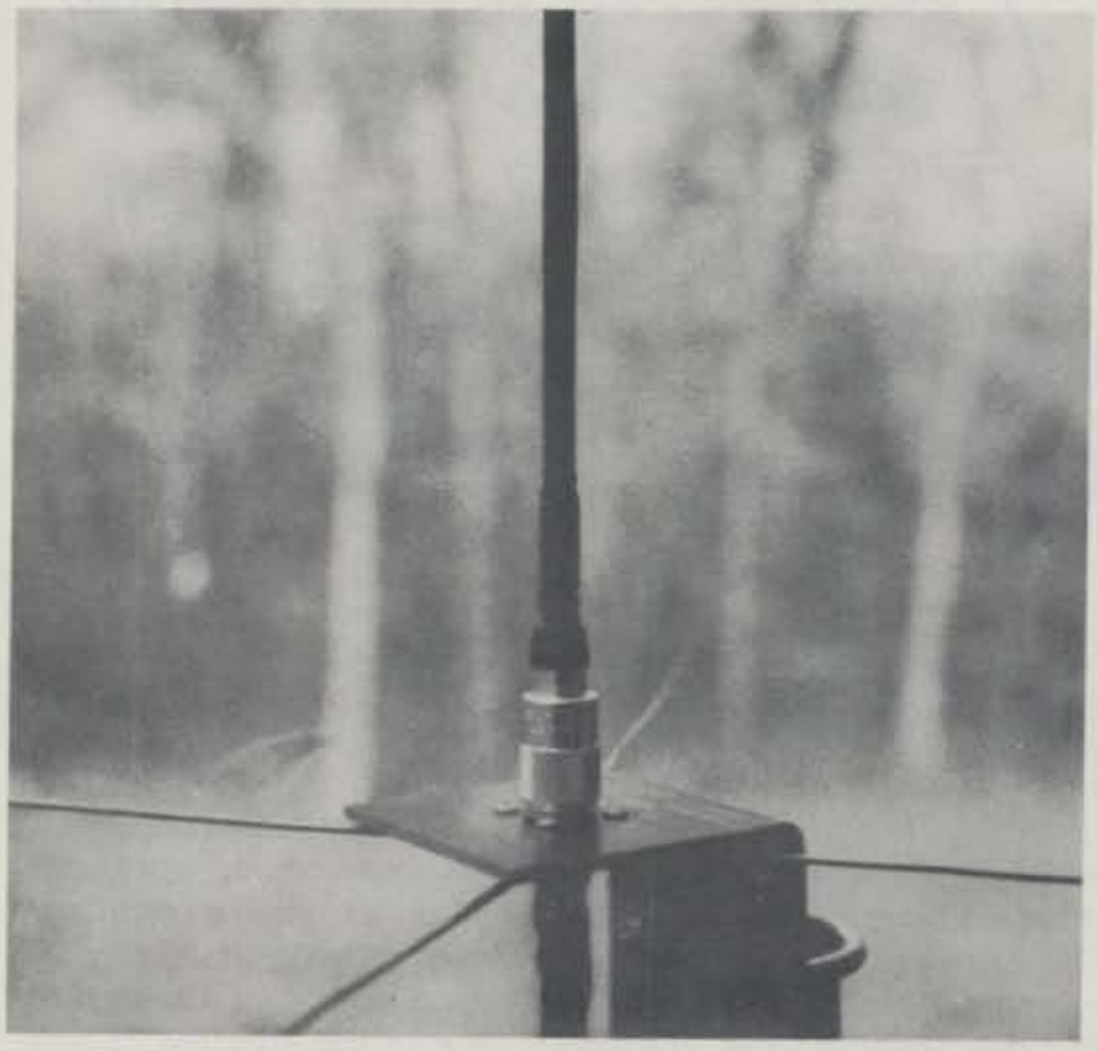
Fig. 2—Antenna Mounting Bracket for 5/8-wave 2-Meter Antenna

ed on the top of an "L" shaped piece of ⅛" aluminum and the hood was installed underneath. The four 4-40 screws that mount the connector and the hood are also used to anchor the four ground plane radials. These radials are simply 19" long pieces of bare #12 copperweld antenna wire with a tight loop at each end, one end to slip over the 4-40 screws and the other end to keep down personal damage when putting up the antenna. Fig. 2 is a detailed drawing of the "L" shaped mounting bracket.

The basic material for the antenna is a length of ¼" diameter fiberglass rod. At the suggestion of WB2GUB this was obtained from Sears-Roebuck in the form of a pennant-topped "whip" meant to be mounted on a bicycle. Originally about 5-feet long, this was cut off at 50⅜". The bottom was drilled with a #46 drill, for about 1¼", as indicated in fig. 1. Referring to the same drawing, a hole was drilled at point "A", at a slant towards the bottom, with a #60 drill, taking care not to go through the rod but only to the concentric hole previously drilled from the bottom. At point "B" a hole is drilled, with the #60 drill, right through the rod. A short piece of #18 copper wire is inserted, and the ends bent over, to serve as a tie point for the top of the coil. ⅛" from the top of the fiberglass rod, point "C" on fig. 1, drill with the #60 drill a hole right through the rod.

The loading coil and the antenna above the coil is made from one continuous length of #18 copper wire, which can be bare or enamelled, about 60"

(Continued on page 94)



Close-up of the antenna connector end of the 5/8-wave antenna showing the heat-shrunk tubing over the coil and over the end of the connector.

RELATIVITY

IN THE HAMSHACK

BY IRVING M. GOTTLIEB*, W6HDM

Some claim that today's hobby of amateur radio is suggestive of a *logic sequence* — you display the proper credit card, then lug home the gear, then digest some programmed instructions, make the requisite associations with ultilities power and the antenna feedline, and this finally culminates with your ability to work the world at will! In an out-of-context way, hamming does, indeed, encompass such activities. But, the observer who supposes that hamdon is adequately described by such a narrow viewpoint tells us more about himself than the object of his evaluation—he speaks out from a flat world devoid of the spatial and temporal dimensions of the real universe. For, even a quickie flick at homo-hamus, himself, shows clearly that we have come a long way baby, and that the best is yet to be!

*931 Olive, Menlo Park, CA 94025.

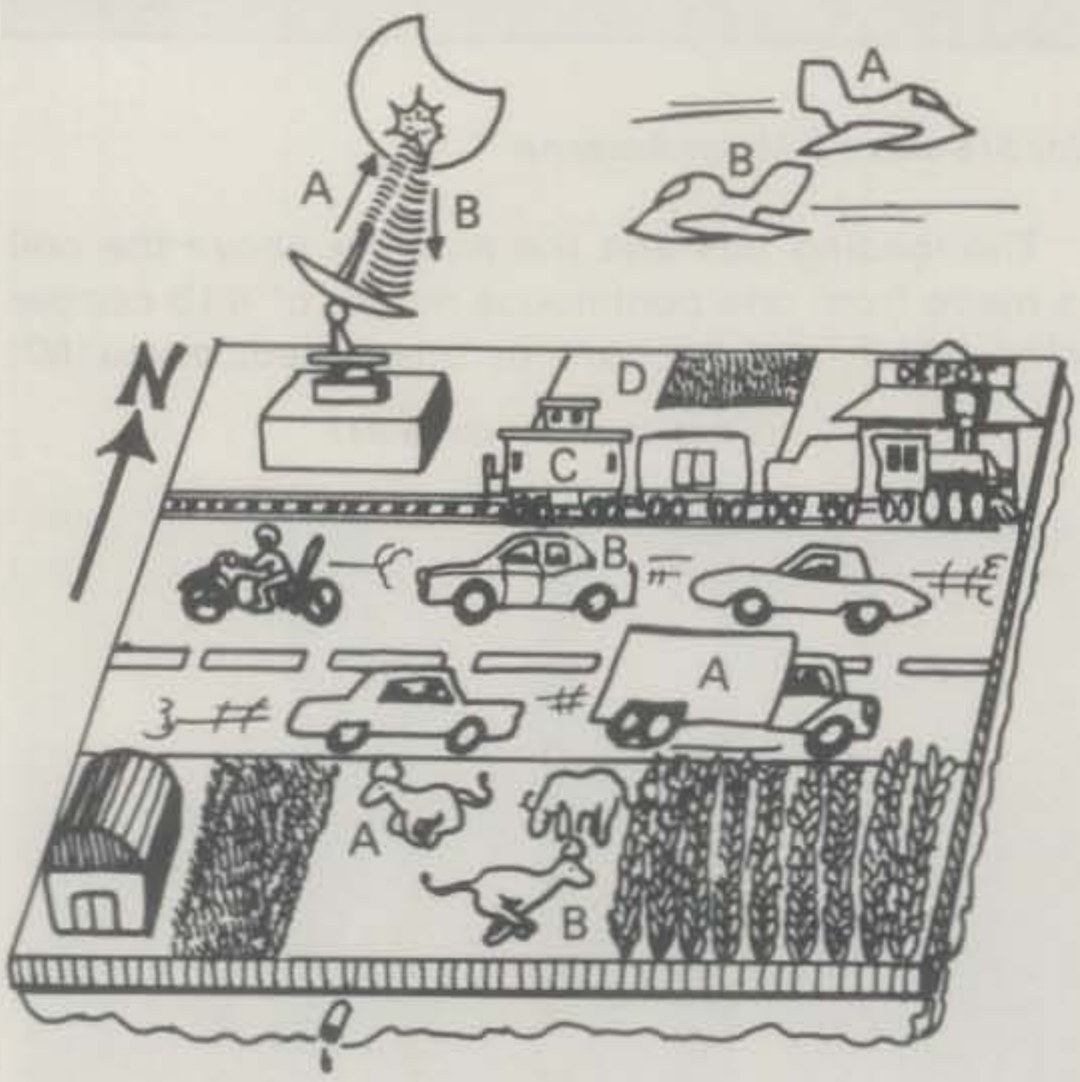


Fig. 1—A peaceful rural scene, but not devoid of relativistic implications. "Common-sense" suffices to establish the relative speeds between most, but not all of the entities depicted above. If we are given the ground speeds of the aeroplanes, the train, the vehicles, and the farm animals, we can, by simple arithmetic, compute relative speeds between either like or unlike entities. For example, if vehicles A and B are moving at 30 m.p.h. in opposite directions, their relative speed is 60 m.p.h. But this reasoning is not applicable to the relative speed of the outgoing and returning radar signals. Although their individual speeds relative to the earth are equal to c, their relative speed to one-another is not 2c.

There is no denying that *one* aspect of current amateur-practice is exemplified by the store-boughten, computer-designed, digitally-controlled station. Those who refer sneeringly to this state of the art fail to reflect that it represents the natural outgrowth of the unbriddled imaginings of yesterday's amateur. Had he, during his era, access to synthesized tuning, frequency-counter monitoring, multi-band and omni-mode operation, he surely would have latched on to these niceties. Are we to naively conclude that, because the amateur has realized some of his day-dreams, his dynamic creativity, insatiable curiousity, and inventive impetus have declined to mere vestigal status, as he boringly fills the kilo-mile voids with chit-chat eminating from a rig cooked up in the corporate silicon-ovens?

Rest assured, fellow amateurs, that remaining with us are the pervasive spirits of adventure, experimentation, and exploration. And, we remain heir to that uniquely-virulent amateur disease — the stupidity to know our own limitations! As ever, you amateur remains a cut-and-try artist. With little effort, you can find him reinacting his original sin, the re-specing of manufacturer's specs. (known in the venacular as *overloading*.) As were his predecessors, he remains a "hooked" empiricist. Long before the word was admissable in mixed company, rumor identified the amateur as a participant in *serendipity*. Such rumors persist. You see today's amateur involved in moon-bounce, radio astronomy, satellite repeaters, TV, and in light and laser communications. QSO's often involve such topics as para-psychology, existentialism, polter-gheists, or extra-terrestial visitors. And when the first UFO con-

tact is made, you can bet your output tubes that the QSOing amateur will press for his signal report and QSL. Emphatically, the essence of the hobby retains its vitality — and then some!

This very-same amateur, as in days of yore, is frequently versed in fields other than the know-how of hooking up and operating radio apparatus. Included are chemistry, photography, astronomy, mathematics, physics, and you name it! It is by second nature, as it were, that the amateur manifests a keen interest in the implications of *relativity*. He knows that Einstein evolved universal principles from the contemplation of what truly goes on in the world's simplest circuit — *a current-carrying conductor!* Any amateur with a soul must intuitively feel that something mundane, practical, and downright pragmatic might be mined from this intellectual ore. And after all, a theory which is so heavily imbued with the nature of electromagnetic radiation can hardly be ignored by a hobby which professes to create controlled radiation!

Now, relativity is an *extensive* subject. It would be foolhardy to attempt even a condensed coverage in a CQ article. Rather, a few of the noteworthy implications of this radical extension to previous intellectual-boundries will be presented. The ability to grasp these cosmos-oriented ideas is, surprisingly, not greatly a function of one's mathematical skill, IQ, or propensity towards mysticism. Indeed, excessive "establishment-moulded' education may impose difficult-to-surmount mental barriers. For, the basic problem in "digesting" relativity centers on the need to *de-educate* one's self with regard to certain notions long justified as being "commonsense". To put it bluntly, a few "security-blankets" must be shed along the path of enlightenment!

The idea of relative motion is not foreign to most amateurs. Various relative-motions can be readily identified in the panorama of rural activities shown in fig. 1. Although we glibly say that a train develops a certain speed, we know that the cited speed is *relative to the ground*. And the speed of an aircraft is meaningless unless we are told whether it is with respect to the air or to the ground. If, with respect to the air, we need to know the effective speed of the head or tail wind involved in order to derive the true-ground speed of the craft. An interesting aspect of electrical technology brings the mind somewhat closer to relativity concepts than does the train, or the aeroplane. We refer here to the idea of relative speed as it applies to the operation of the *induction motor*. As you know, there are involved two rotating entities in the polyphase induction motor—the magnetic field, and the rotor, itself. (It is desirable to deal with two or three-phase induction motors because their rotating fields are nice and symmetrical. By contrast, the single-phase induction motor develops a lop-sided field which has both, rotating and pulsating components.)

Fig. 2 is a simplified drawing of a two-phase induction motor. And fig. 3 shows what happens if the relative speed between rotor and field were zero — the torque would fall to zero. The induction motor can be viewed as a transformer with shorted secondary. A physical force is thereby developed between the "primary" (stator windings) and the "secondary" (squirrel-cage rotor). Indeed, an important design factor in large static-transformers is to *restrain* the windings from their tendency to move when loading is heavy, and especially under short-circuit conditions. This tendency is a manifestation of Lenz's Law and will not be further detailed here. Suffice it to say that the induction motor is *deliberately* designed to allow relative motion between the

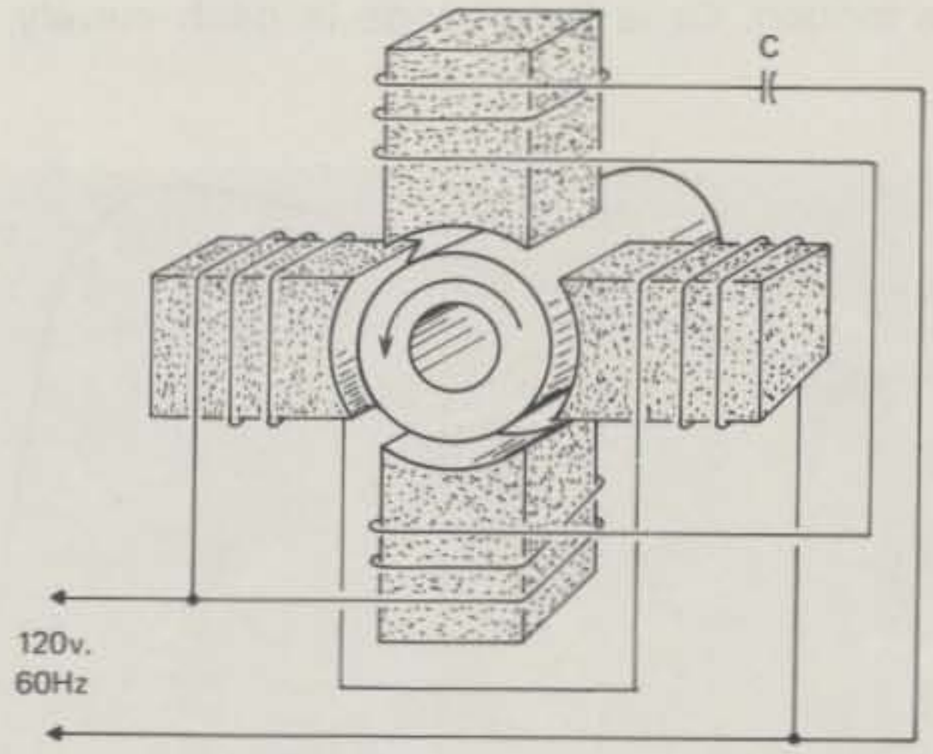


Fig. 2—The two-phase induction motor is an example of "applied" relativity. An important operating parameter is the speed of the rotor relative to the speed of the rotating magnetic field. These two rotating entities can not attain synchronism, for then the rotor would develop zero-torque, and could not maintain such speed. For example, a loaded motor might operate at 95% of synchronous speed (the speed of the rotating magnetic field). In a two-pole, two-phase induction motor powered by a 60 Hz supply, the rotor speed would then be 95% × 1800, or 1716 r.p.m. (In the situation shown, the motor is actually a two-phase machine operating from a single-phase source. This is enabled by the phase-splitting capacitor, C).

"primary" and shorted "secondary" windings. Now, the faster the motor runs, the slower is the relative speed between the rotating magnetic-field developed in the stator, and the rotor, itself. One might suppose that the rotor would accelerate up to synchronous speed — turning in unison with the rotating field. But then the rotor conductors would not be "cutting" flux and would have no short-circuit current induced in them. This being the case, the rotor could not sustain such synchronous speed because no torque would be developed. In actual operation, when the motor starts, the rotor *tends* toward synchronous speed, but must attain an equilibrium at a *slower* speed in order to torque its load requirement. Even at no load, such a motor

runs below synchronous-speed. Thus, at all times a *relative speed* has to exist between the rotating magnetic-field and the rotor.

Now let us immerse ourselves a bit deeper into relativity concepts. Consider a train approaching a depot such as we see in fig. 1. We know that the Doppler effect will cause the locomotive whistle to *increase* in pitch during its approach to the depot. Or so reports an observer at the depot. And the same observer informs us that the pitch *decreases* as the train recedes from the depot. All during this time, the locomotive engineer has heard a *constant* pitch shriek from the whistle on his locomotive. Has the pitch changed for the observer, but not for the engineer? Has the *actual* pitch changed, but somehow not been perceived by the engineer because of his motion. Or is the change in pitch merely an

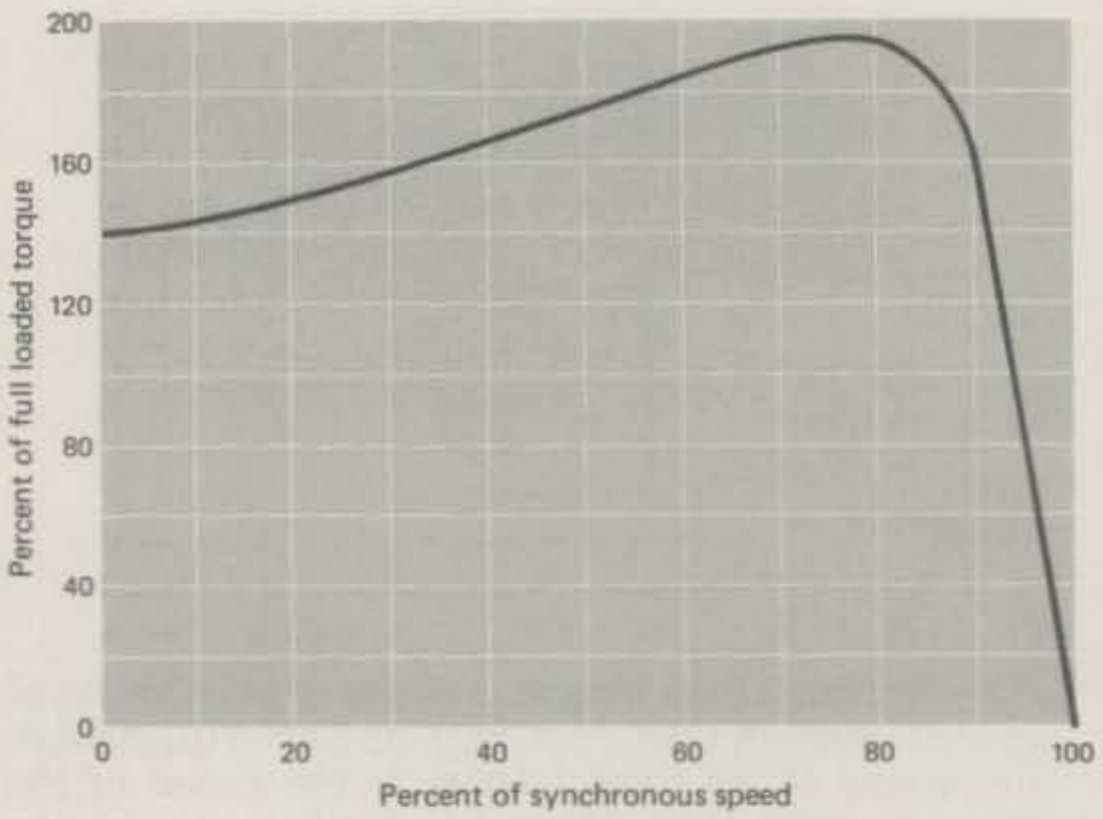


Fig. 3—Torque-Speed characteristics of an induction motor. Note that at 100% synchronous speed, when there is no relative motion between the rotating magnetic-field and the rotor, the torque of the motor falls to zero. Thus, the induction motor cannot run at synchronous speed.

illusion for the observer? These questions are deserving of considerable contemplation, for they are analagous to those which suggest themselves in relativity situations. The answer to the dilemma that two "measurers" (the observer and the engineer) record *different* measurements is that *both are correct from their respective frames of reference.* Specifically, the engineer is at *rest* with the source of the sound, whereas the observer is in a frame of reference where there is *relative motion* between himself and the sound source. Obviously, the pitch of the whistle has not changed insofar as concerns the acoustic vibrations impinging on the air. The discrepancy between the two measurement makers is a *measurement phenomenon.* Both, observer, and the locomotive engineer are correct, despite their different experiences. *Neither* has suffered an hallucination!

In fig. 4, we see a waveform displayed on a *defective* oscilloscope. We *know* the 'scope is out-of-kilter because it displays a waveform indicating *negative* time. Time, as we know from all manners of experience can be infinitesimally short, but cannot "flow" backwards. Or can it? Let's see how our traditional concept of time bears up in the relativist's domain.

Einstein pointed out that *simultaneity is relative.* Such a statement may initially strike us as a negation of a definition, or as other semantic hanky-panky. Let's reserve judgement and refer to fig. 5. Planets A and C are equi-distant from planet B. Just as a rocket is making a fly-by past planet B, powerful light-flashes emanate from laser sources on planets A and C. In everyday language, one would say that the flashes have been timed to occur *simultaneously* from the viewpoint of an observer on planet B. But, what does the pilot of the rocket see? In (b), some time has elapsed and the light pulses are on their respective journeys through space. Note also, that the rocket has made some headway. In (c), the rocket pilot observes a flash of light from planet C. The observer on planet B has, thus far, *seen neither flash.* In (d), the observer on planet B detects the "simultaneous" light flashes which originated on planets A and C. Finally, in (e), the pilot of the rocket observes a flash of light from planet A. In the above scenario, it is obvious that a "sequence" of events has transpired, but the two observers have detected the light flashes at different times. And for one of them, the flashes did *not* occur simultaneously.

Which observer perceives events correctly ? As with the Doppler-effect situation, *both* observers are correct with respect to *their own* frames of reference. Would you say that the rocket pilot previewed a "future" event destined for planet B? (If nothing else, a study of relativity should illuminate the universal search for "reality".)

Einstein further postulated that rods in motion relative to an observer are perceived to *shorten* in the direction of their travel. By "rods" is meant any physical length. For simplicity, let's deal with rockets. If, say by a sophisticated laser-radar, an earth-bound observer measures the length of a rocket making a fly-by in outer space, the rocket will appear shorter than it would be measured by its *crew.* And, the more substantial a fraction of the speed of light the rocket attained, the more pronounced would be this shortening effect. If it closely approached c, the speed of light, its configuration would appear to the earth observer as a *disk.* But, to the crew aboard the rocket, it would retain its full-length cigar-like shape. Again, *both* observers are correct from their respective vantage points. But, hold on — the observers have *another* bone of contention!

Einstein also postulated that such observers as

we have just dealt with would see one-another's time flow in different "lights." To the earthly observer, all clocks aboard the rocket keep *slower* time than do their counterparts on earth. By "clocks" are meant all manners of timepieces — mechanical clocks, crystal oscillators, radio-active substances, and biological metabolisms. Now, none of these clocks are affected per-se by the rocket's speed, or we should say, speed relative to the earth. The crew of the rocket have no way of discerning or measuring their relative motion, except by figuratively "looking out of the window". Indeed, we may suppose that life could become monotonous and boring aboard such a craft. And mechanical clocks might well have to be occasionally shaken or "dithered" in order to keep their bearings friction-free (or relatively so). Supposing that a clock aboard the rocket signalled its hourly status by triggering the burst of a powerful laser directed towards the earth. The earthly observer might detect such flashes every two hours, every ten hours, or every ten days depending on how closely the rocket's speed approached c, the speed of light. Again, the discrepancy in time flow is a *measurement phenomenon. Both*, the crews' concept of time flow aboard their craft, and that of the earthly observer is correct from each measurement maker's frame of reference. Surprisingly, however, a situation can be postulated wherein *both* time flow-rates can be brought together for comparison!

Ten years ago the captain of a rocket ship bade goodbye to his twin brother on earth. The rocket underwent a period of acceleration, short compared with the time it roamed in space, at a speed close to that of light. After some time, it again heads back to earth, decelerates, and makes a successful landing. The captain, visibly-aged ten years, climbs out and embraces an *elderly* man, scarcely able to survive the emotional trauma of the occasion (fig. 6). That decrepid oldster is the rocket captain's *twin brother!* Their internal biological-clocks now reveal the *practical* consequence of Einstein's hypothesis — that clocks observed in motion slow down.

Has the rocket captain lived a different length of time than his twin? Has he lived at a slower rate? Has he attained a free ticket to longevity? Before you answer these "simple" questions, consider the fact that the captain has perceived *no change* in his biological rhythms. He did not expect to be confronted by a twin even one day "older" than himself. What goes on here, he wants to know! (No doubt, so do we.)

In this "twin-paradox", the argument is often presented that the earth could have been considered as the object in relative motion to a *stationary* rocket. Therefore, it is contended that the earth-bound twin had equal opportunity to greet a similarly-aged rocket captain. However, the situation is *not* mathematically symmetrical in that it was the *rocket Captain* who experienced both acceleration and deceleration. This suffices to bring about the unique, and non-interchangeable, experiences for the individual twins.

The real beauty of relativity is that the *same* simple-formulas account for both "common-sense" phenomena (those which involve "ordinary" speeds — tiny or negligible fractions of the tremendous speed of light.) and relativistic phenomena (those which involve speeds of, say a tenth or a greater fraction of the speed of light.) On the one hand, two oppositely traveling 30 m.p.h. vehicles collide head-on at a relative speed of *60* m.p.h. On the other hand, the *same formula* shows that a "head-on collision" of light beams occurs at a relative speed of *c*, not 2 c!

The magic formula that has to do with relative speed involves only first-year high school algebra.

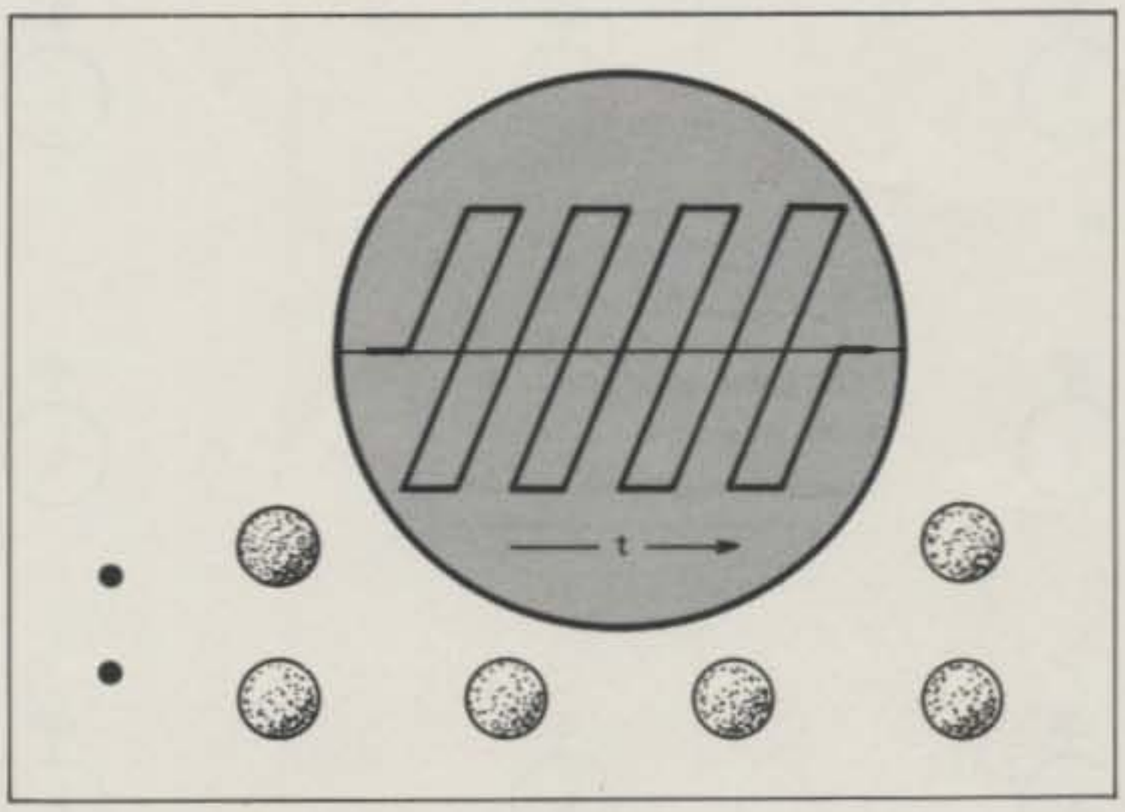


Fig. 4—Negative time depicted on an obviously defective oscilloscope. No Fourier waveform analysis is needed here—we "instinctively" know that a sequence of events cannot be altered in time. But in relativity, such notions as "before", "after", or simultaneous", depend on the frame of reference from which such observations are made.

It is as follows:

$$s = \frac{u + v}{1 + UV\,2_c}$$

where s represents the relative speed between two entities moving with constant speed along the same axis

where u = the speed of one entity in constant speed motion relative to the earth.

where v = the speed of the other entity in constant speed motion relative to the earth.

where c = the speed of light in free space = 186,000 miles per second

A little experimentation with this equation quickly reveals its ability to comply with the "common-sense" of everyday experience, and also with the

"far-out" postulates of relativity. For example, the afore-mentioned head-on collision between two vehicles traveling at 30 m.p.h. yields the expected relative speed of 60 m.p.h. divided by one plus an infinitesmally-tiny fraction. *For all practical purposes,* the relative speed between the vehicles is 60 m.p.h.

Next, let us look at the head-on collision between two electrons, each having a speed relative to the frame of reference of the laboratory of two-tenths

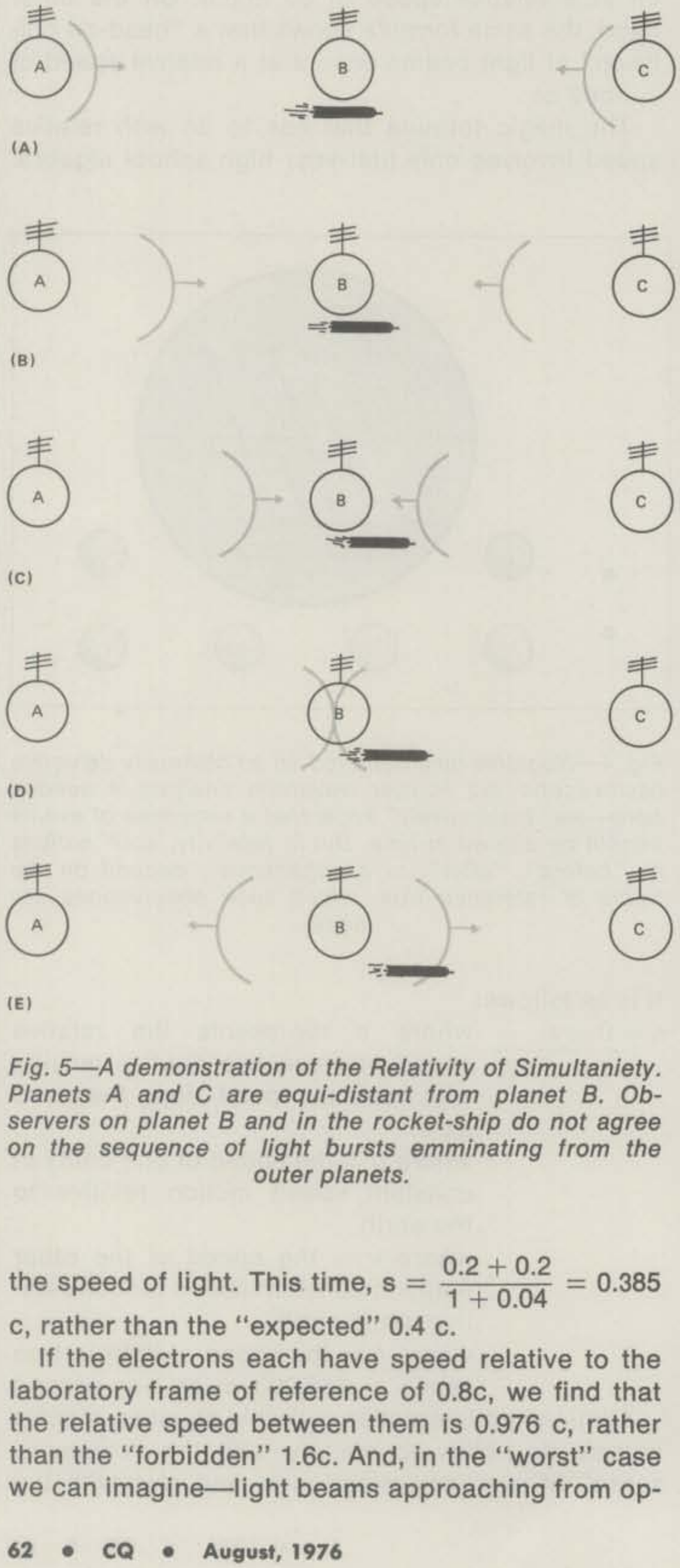


Fig. 5—A demonstration of the Relativity of Simultaniety. Planets A and C are equi-distant from planet B. Observers on planet B and in the rocket-ship do not agree on the sequence of light bursts emminating from the outer planets.

the speed of light. This time, $s = \frac{0.2 + 0.2}{1 + 0.04} = 0.385$ c, rather than the "expected" 0.4 c.

If the electrons each have speed relative to the laboratory frame of reference of 0.8c, we find that the relative speed between them is 0.976 c, rather than the "forbidden" 1.6c. And, in the "worst" case we can imagine—light beams approaching from opposite directions, $s = \frac{c + c}{1 + \frac{(c)\ (c)}{c^2}} = \frac{2c}{2} = c$. Thus, there is no ifs or buts about the statement that light propagation is *limited to speed c.* An even greater shocker is in store for our benummed senses, conditioned as they are, in the illusory world of everyday experience. It turns out that the relative speed between two light beams traversing merrily through space along parallel paths and in the *same* direction, is *not* zero, but is again c! Actually, you would not have it any other way, for if speed must be *relative* to be meaningful, and if the free-space "speed" of light is c, it must follow that it must be so, relative to *anything and everything.*

Let's suppose you are in no mood to let the author off so easily. After all, a major violation of elementary "logic" has apparantly occurred. Moreover, to infer that, "light must travel with the speed of light," might well invoke litigation over plagiarism were Gertude Stein or Ogden Nash yet among us. So, let's look at the situation from a slightly-different viewpoint.

The energy invested in light resides in packets, of quanta, designated as *photons.* Now the photon is not construed to be a "material" particle. The photon, nonetheless, displays properties similar to that of *mass* in physical bodies which are comprised of "material", "substance", or "matter". For example, gravitational force will bend the trajectory of a light beam in analagous fashion to that of a baseball intended by its thrower to follow a horizontal path. The photon is, at the same time, unique because its mass is entirely the *consequence of its relative motion through space.* Unlike other entities, material ones in particular, the photon's mass does not tend towards infinity at speed c. So the light photon thereby is *capable* of speed c. (Other entities, because they approach *infinite mass* as speed c is neared, cannot actually attain speed c—that would require *infinite accelerating force.)*

Hopefully, now we see that the light-bearing photon *can* travel at speed c. But this statement serves only as a prelude to the insistance that photons *must* have the free-space velocity of c! If this strange entity dared allow itself to be measured at a *slower* speed, it could, then, also be seen at *rest* from some particular frame of reference. (For then, it would be in an analagous situation to an auto and a bus, both headed in the same direction at the same speeds. Each driver would rightfully say the other vehicle's relative-speed is zero.)

So, what's wrong with a situation where an imaginary rider on an entity going at sub-c speed observes the relative speed of an imaginary sub-c light beam as being *zero?* As with the bachelor's assessment of the girl who was only a *little-bit* pregnant, *everything's* wrong! Specifically, photons thus seen at rest would manifest zero-mass, and could not behave as a source of radiant energy.

We previously attributed *magic* properties to the equation $s = \frac{u + v}{1 + uv/c^2}$. That, perhaps, was a bit far-fetched. But it does have the marvelous characteristic that the relative speed between two entities, s, comes out to be the speed of light, c, whenever at least *one* of the moving entities, u or v, propagates with speed c. This tells us that there is no way in which the photon can be caught with its pants down! More to the point, the interpretation of such behaviour in this equation is that the free-space speed of light is *c*, relative to *anything, and to everything!* Nor does it matter about the *directions* in which light or other entities travel. If all this boggles the mind, let it be pointed out that older concepts which allowed consideration of *infinite* speeds, and *instantaneous* actions over distances, invoked scientific indigestion of a much more serious nature. If you think the behaviour of light appears strange as explained by relativistic theory, it should be fully realized that explanations were less than soul-satisfying before Einstein came along. For example, principles of nature involving infinity can be seen in retrospect to be nebulous, indeed. Anything you do to infinity leaves it unaffected. You can *add* to it, *subtract* from it, *multiply* or *divide* it, and it just remains infinity. Most scientists have welcomed the substitution of finite c for the previous appearance of the infinity symbol in light-propagation equations. Far from being arbitrary, the imposition of a *limiting* speed to motion has been confirmed by a large and diverse number of experiments, and has united what previously appeared to be divergent or independent theories.

The impetus for Einstein's probes into natural phenomena stemmed from a simple current-carrying conductor, such as shown in fig. 7. But, as we might well suspect, there is more than meets the eye here. When Einstein began his speculations, it was already known that the mysterious force of *magnetism* could be attributed to charge carriers, such as electrons, in motion. In fig. 7, the electrons, impelled by a source of "electronic pressure" such as a battery, move to the right at a speed, u. Now, in ordinary metallic conductors, u is surprisingly slow. A given electron may have an average drift of, say 1 mm./sec. Thus, the popular notion that electricity moves like "greased lightning going down-hill" is not necessarily so. One begins to wonder how relativity effects can be of consequence here.

When we say that the electrons have a net drift to the right in the current-carrying conductor of fig. 7, that is observer A's viewpoint, who is at rest with the laboratory frame of reference, as well as with the conductor. (Incidentally, the "speed" of electricity fortunately does not depend upon the time required for a given electron to traverse the length of the conductor. As soon as you impress a voltage across the ends of the conductor, a billiard-ball-like sequence of impacts occur and in a substantial fraction of c, electrical effects are produced in the conductor, or in the circuit.) From A's viewpoint, the moving electrons produce concentric lines of magnetic force encircling the conductor directed as indicated by the arrows. A also sees the positive-charged bubble, which we can suppose to be buoyed up by the air, remain stationary whether or not the conductor carries current. This is quite acceptable to observer A — no force acts on the charged bubble, for current-carrying conductors thus viewed create no electric field, i.e., one finds no electric charge on the *surface* of the conductor. Also, as we know, a stationary charge such as the bubble, just ignores a stationary magnetic-field. So, observer A concludes that *no net force* is acting on the charged bubble.

Fig. 6—The space-time rendesvouz. The returning astronaut greets his stay-at-home twin.

What else does observer A see? Well, if he is observant, he notes that the positively — charged nuclei of the atoms comprising the conductor are substantially stationary—at least they display no net movement to the right or to the left.

Now let's look at things from the viewpoint of observer B, *who is in motion at speed u to the right.* Although we know B will see a different situation than A reports, we know that something would be topsy-turvy if B claimed the charged bubble to be in accelerated motion. Why? Simply because a net force is required to accelerate any mass. It is OK for an entity to be seen in *constant-speed motion* by one observer, and at *rest* by a second observer, who views from a different frame of reference. Newton showed that bodies at rest and those moving at a constant speed in a straight line were alike in the respect that *neither* was acted on by any *net force.*

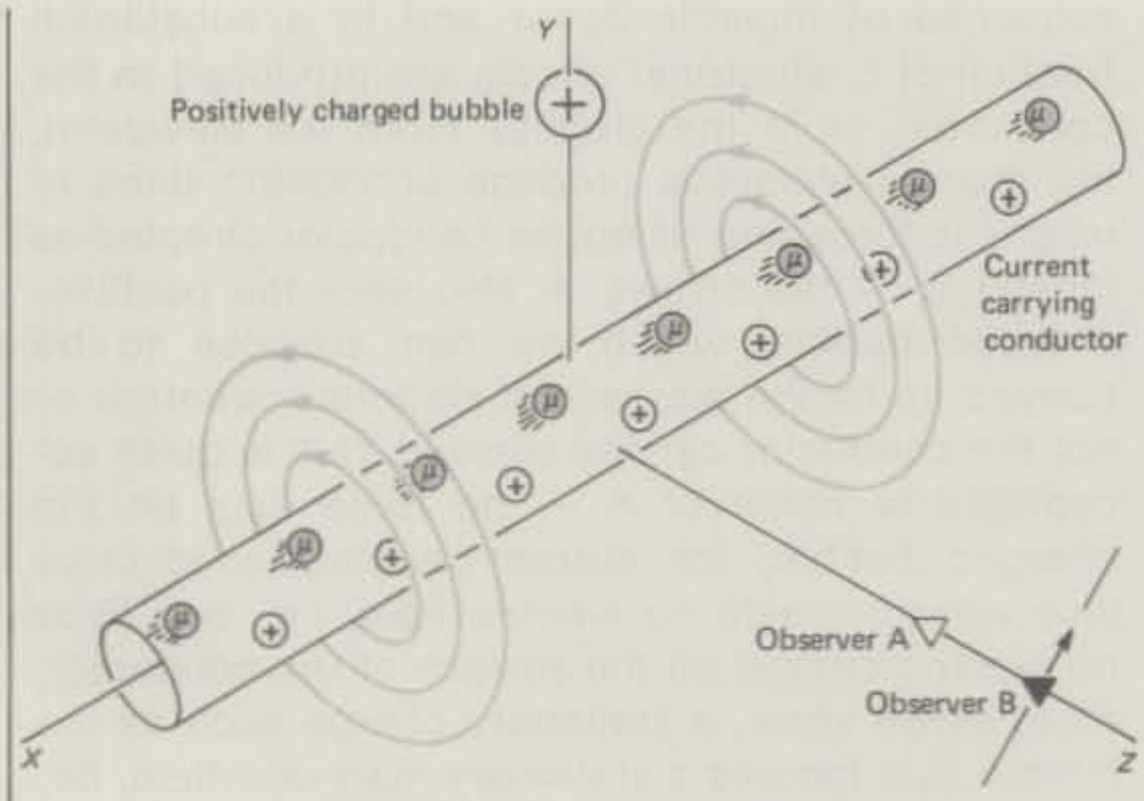


Fig. 7—A current-carrying conductor, the genesis of the relativistic viewpoint. Two observers, A and B, describe the events accompanying a current-carrying conductor in different ways. There must, however, be certain correlations between their reports in order for the laws of motion, electricity, and magnetism to remain valid. A positively-charged bubble is imagined to be suspended above the conductor. The response of this bubble to the fields "seen" by the two observers is investigated and interpreted.

Inasmuch as observer B moves to the right at the same speed as the electron drift, the electrons responsible for the current now appear stationary. Is there, then, a current in the conductor? Yes, because the positive ions (the atomic nuclei) now appear to be moving to the *left.* This is equivalent to observer A's situation insofar as concerns current flow. Or you could interpret B's observation in another way: He sees the conductor moving to the left with respect to the "stationary" electrons. This, too,

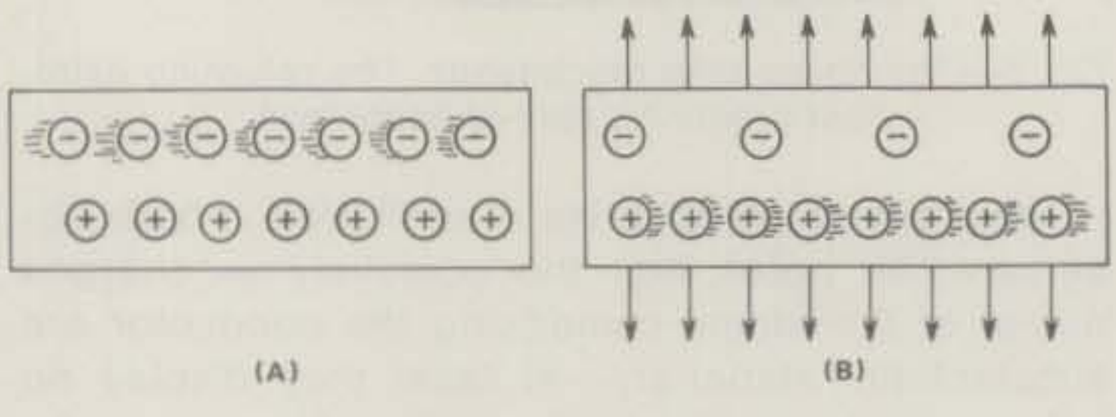


Fig. 8—Grossly simplified and tremendously exaggerated "view" of the two observers in fig. 7. (A) Observer A's description of events in the current-carrying conductor: The negative charges are in motion to the right. The positive charges remain stationary. Because the same space exists between adjacent negative charges, and between adjacent positive charges, the surface of the conductor is neutral—it bears no charge. (B) Observer B's description of events in the current-carrying conductor: The positive charges are in motion to the left. The negative charges appear stationary. The spacing between negative charges is more than A's observation; the spacing between positive charges is less than in A's observation. The unequal spacing between charges results in the surface of the conductor being positively charged—observer B sees electrostatic lines of force emminating from the surface.

can be said to be equivalent to A's report that an electron current is flowing to the right within the conductor.

Substantially the same magnetic field is seen by observer B as had been described by observer A. Interestingly, however, this field is now created by a *different* mechanism—by positive charges moving to the left, rather than by negative charges (electrons) moving to the right. (If you recall your "left-hand rule for conductors", you can check this out easily enough.)

So far, so good, but when observer B views the charged bubble, he sees it moving to the left. This may lead to trouble, for a charge in motion in a magnetic field experiences a deflective force—as we know from such practical devices as electric motors and cathode ray tubes. And a force prevailing on an entity such as the bubble would set it in accelerated motion. If this were, indeed, the case, we shouldn't be surprised to find one observer questioning the other's sobriety! *For, it is not possible for an entity to appear in accelerated motion in one frame of reference, and not in another.*

But wait! Observer B has *more* to report. Because rods in motion appear to shorten in the direction of their travel, the *spacing* of the positively-charged atomic nuclei appears to be *less* to observer B than it does to observer A. By the same token, the spacing of the negative charges which produce the electron-current appears *greater* to observer B than to observer A. Therefore, the conductor, which A finds to be electrically neutral (no net charge on its surface) is not so from B's viewpoint. Observer B sees a situation in which the density of positive charges exceeds that of the negative charges. As a result, B finds the *surface of the conductor to bear a positive charge*. See fig. 8. And, although it might appear too fortuitous to be true, the electric field emminating from this surface charge exactly cancels the tendency of the charged bubble to accelerate! So, the bubble merely moves at constant speed, u, to the left, according to observer B. As previously stated, this is OK. In B's world, the charged bubble is subjected to *two* forces, but experiences *no net force.* (Incidentally, when we "produced" the electrification of the conductor, we could have gone on and re-invented the electric generator.)

Naturally, all this time you have been pondering how relativistic effects could manifest themselves at speed which are truly *infinitessimal* compared to the velocity of light, c. Even though the slowly-drifting electrons each invokes an exceedingly-minute relativistic effect, there are *trillions upon trillions* of them. Moreover, the forces between electric charges are *tremendously great.* If you alter their ordinarily balanced state by what might you might initially guess to be a negligible factor, the imbalanced

(Continued on page 94)

ADRIAN WEISS, K8EEG, ON

QRP

"Trans-Atlantic QRPp— WB2OZW to OZ4LP on 10mw"

Two separate groups of amateurs are seriously attempting to enlist modern technology and hardware in the effort to render extremely low power communications feasible and practical despite today's crowded band conditions, high power ratrace, and sunspot minima. These groups share some philosophical premises in common, chiefly, the congestion on the bands has led to the use of higher power, which has in turn caused more congestion, which calls from even higher power, and so on around the circle. In a future column, I hope to present information on a brand new c.w. technique called "Coherent C.W." by W7GHM, its originator. Perhaps some readers will be interested in joining the CCW effort. In the present column, I'd like to present information on the work of a small group of amateurs in Denmark—OZ1BDT, OZ9FS, OZ4LP, and OZ8BS—who have been experimenting along the lines suggested by OZ9FS in the comments to follow. After having enlisted WB2OZW (Paul T. Atkins, 56 Ormsay St., Park Ridge, NJ 07656) as a stateside ally, the group managed to bridge the Atlantic (one-way) with a 10mw signal on December 28, 1975, on 20 meters. WB2OZW's comments will provide details on the preparations for, and execution of, the successful December 28 experiment.

"Narrow Band CW— Problems & Promises"
OZ9FS

1.) **Problems.** The traffic on present day h.f. bands is very heavy. An empty frequency is one where there are only 3 or 4 guys operating already. We find ourselves using kilowatts not to compensate for propagation losses, but merely to clobber the other guy. Clearly the kw race does not represent a long term solution.

2.) **Some Basic Considerations.** (a) *Transmission.* The spectrum covered by an on-off keyed c.w. transmitter sending "F" bits (dots and dashes) per second is approximately 2F. If the maximum band available is "W", the ultimate number of hams "H" that can transmit simultaneously without interfering can be given in the formula: W=2HF. Since W is fixed by the authorities, the only way to increase H is by reducing F, *e.g.*, by reducing the codespeed to accommodate a narrow-band receiver whose bandwidth 2F will permit only signals equal to or less than the F speed to pass. (NB: as a code signal increases in speed, so does its bandwidth). (b) *Reception.* Narrow receiver bandwidths on the order of 1-10Hz may be realised using phase-locked loops, active filters, or digital techniques, none of which requires sophisticated test instrumentation—in contrast to what is needed to build an s.s.b. transmitter. The combination of slow code speed and narrow bandwidth in the receiver practically eliminates the effects of QRM. Another source of interference is the "white noise" generated in the receiver itself. White noise output "N" from a receiver is proportional to bandwidth "B": N (watts)=kB(Hz). Roughly speaking, if the receiver bandwidth is reduced a thousand times, the transmitter ERP may also be reduced a thousand times, but the transmitting code speed must also be reduced by the same factor. Nature thus allows us to trade off ERP with transmission speed in gaining an advantage over interference. However, the bandwidth cannot be reduced indefinitely. One limitation is the coherence length of ionospherically propagated radio waves. (c) *Speed Trade-off.* Some of the speed trade-off may be recovered by com-

The impressive station of Paul T. Atkins, WB2OZW, who transmitted the 10 milliwatt signal copied in Denmark. The QRPp transmitter is seen at the right bottom corner.

*83 Suburban Estates. Vermillion, SD 57069.

A close up shot of the QRPp transmitter (upper right) built by 16 year-old OZ1BDT, used in the tests. At the far left is a homebrew keyer built by WB2OZW. Paul included the comment that he's worked numerous EU stations with the little rig. Contact with GM3AWW on April 15, 1976, was initiated at 50 watts (589) and dropped as follows: 800 mw (569), 59mw (449), 13mw (339), 6.5mw detectable but not readable). GM3AWW's QSL and letter was included, but is unreproducable.

pacting presently used codes. With dots and dashes corresponding to digital logic 1's and 0's, one 8-bit code string can identify one of 256 messages in the same amount of time that it takes to send a single "CQ" using conventional code. If you permit the time required for two conventional code "CQ's" as the limit for the above digital approach, the possible number of messages that could be identified goes to 64,000. If you have something to say that can't be said in one of 64,000 different ways, it is probably interesting enough to listen to in order to justify Morse code usage.

Sinn Steenstrup, OZ9FS, at OX3FS's QTH, with his QRPp rig several years ago. Finn initiated the QRPp work being carried on by a small group of amateurs.

3.) **Implementation.** The receiver used in the experiments allowed a choice between 400 Hz bandwidth with an 8 pole i.f. filter, plus a 16 pole audio filter providing a 5Hz bandwidth. When using the 5Hz bandwidth, signal readout is by means of a paper chart recorder. Extreme stability is the essential ingredient of the transmitter device. A special circuit was designed using a crystal controlled oscillator followed by three stages of buffering, with a driver/final set up for an output of 1 watt into 50 ohms. A 0-21dB step attenuator is built into the transmitter circuit. The transmitter delivered to WB2OZW for the tests, for some reason or other, drifted too much for use of the 5Hz bandwidth during the tests. A special keyer was designed using IC's. It sends a string of "H's" with spacings of the duration of one "H". The speed is selectable for automatic sending of "H" with dots of 0.5, 1, 2, 4, and 8 seconds duration.

4.) **Future Work.** The experiments carried out with the aid of WB2OZW represent a first step in a QRPp feasibility study initiated by this writer about a year ago in an attempt to try potential methods of allowing amateurs to communicate via c.w. with reduced interference and reduced transmitting power. Our group continues to work along the above lines, but at a rather slow pace, and on a very limited budget. It is not unusual that hams have access to sophisticated equipment, and although it need not be part of an ultimate narrow band amateur station, it can be very valuable in finding out what should go into such a station. If any readers feel like taking part in the fun and can contribute to the program in a relevant way, please drop me a letter. (Finn Steenstrup, OZ9FS, Oernevej 3, DK 4330 Hvalsoe, DENMARK.)"

"The December 28 Trans-Atlantic Test" WB2OZW

After several earlier attempts, WB2OZW succeeded in transmitting a 10 milliwatt signal from NJ to Denmark on 20 meters. If you decide to say something about this project, it will be greatly appreciated. Enclosed is a picture of Finn, OZ9FS, taken in Narssarssuao, Greenland, where he was Engineer-in-Charge of a space station which received weather information from satellites etc. He is holding one of his early QRPp rigs.

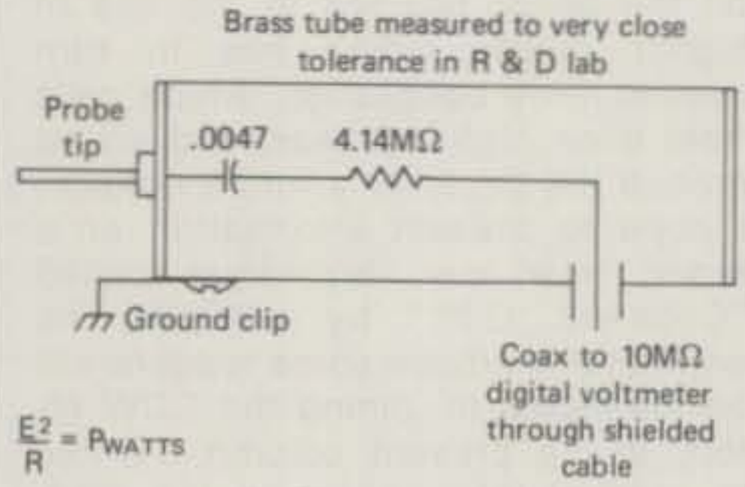


Fig. 1—WB2OZW's r.f. probe.

I used to work him at that QTH, as well as his brother-in-law Peter, OX3LP (OZ4LP). These two fine individuals have visited my home on a number of occasions, and my wife Lynn always has had the welcome mat down for both of them. The QRPp transmitter used in the test was delivered in the suitcase of OZ9FS during a quick business trip to NJ in November, 1975.

We decided to run the tests during the Christmas holidays so as to take advantage of my two week vacation. I am sure that readers will appreciate the difficulty of working QRPp on 20 meters on a Christmas holiday weekend!

As a preparation for the experiments, I had to accurately measure the power output level as well as the losses in my transmitting system in order to be able to be sure of the power involved. I built four different types of r.f. probes to measure power

(Continued on page 91)

Math's Notes

BY IRWIN MATH, WA2NDM

Using Calculator Chips

The overwhelming popularity of low cost calculators has made a rather sophisticated integrated circuitry, the heart of these units available to the experimenter for very little cost. This "computing" chip, properly used, will not only perform the common arithmetic operations by pushing buttons on a keyboard, but can also be interfaced or addressed by other circuitry allowing the construction of "calculating test equipment" or other such ultra-sophisticated gear.

To make use of a calculator chip it is important to first understand how to interface the device—that is how to get information and instructions into and out of it. A detailed explanation of the inner workings is not necessary and, at this stage, would only confuse matters. This month we will look at the input and output considerations for calculator chips and next month, look at non-calculator applications of these chips.

For our discussion we have chosen one of the simplest and lowest cost calculator integrated circuits available today. This is the National Semiconductor type MM5736. This 18 pin DIP type I.C. is a six digit four function device that will add, subtract, multiply and divide positive or negative numbers of up to six digits.

*5 Melville Lane, Great Neck, NY 11020.

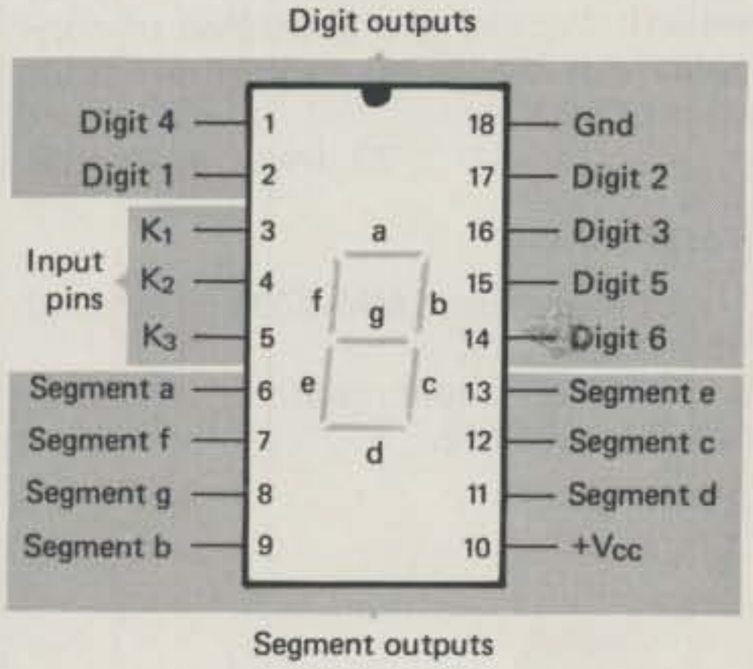


Fig. 1—MM5736 calculator chip (top view) and 7 segment number scheme.

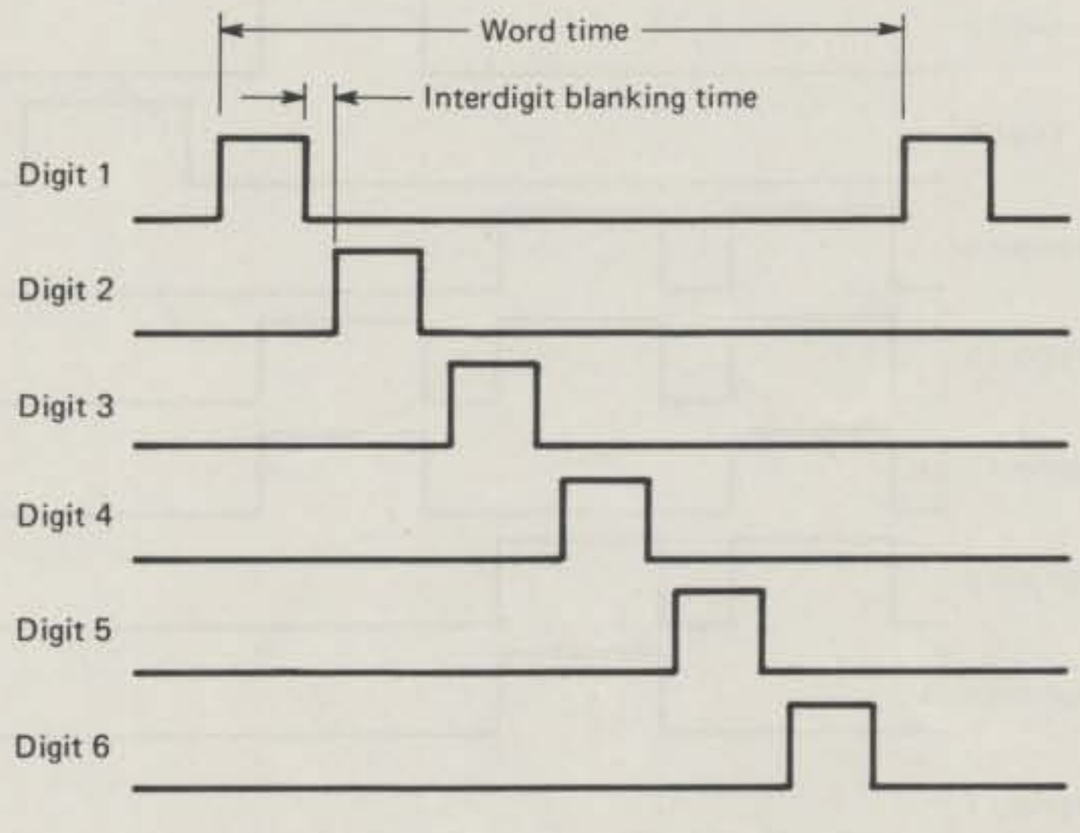


Fig. 2—Output wave shapes from digit pins as discussed in the text. Note that one so-called word time, all six digits are individually scanned or "enabled".

As can be seen from the pin diagram in fig. 1 it has 3 inputs that are normally connected to a calculator keyboard, and a two section output—one section for number segments and the other for digits. At this point an obvious question that one might ask is "how can all of the numbers from 0-9 as well as the four commands (+−×÷) be fed in on only 3 pins while on only 13 pins, as many as six numbers, made up of seven segments each, are displayed? The answer is that all inputs and outputs are multiplexed—that is the function of all of these pins varies at different times. To see how this works let us refer to fig. 2. Here we see the conditions of the output section concerned with digits, (not in themselves strong enough to directly drive a readout). Each of these signals is fed to a separate drive chip which enables (or applies power to) one of the digits of a specially hooked up six digit readout.

In a similar manner, the seven segment pins apply power to the proper segments to form the required number as the digits change. These outputs are capable of driving some readouts directly and do not require separate drivers.

Fig. 3 shows the complete output hookup and should clarify what happens. Also shown in the hookup are the conditions of both output sections when displaying the number "123". During digit 3 time the b and c segments are enabled and the result is the number 1 being displayed. During digit 2 time the a, b, g, e and d segments are enabled and the number 2 is displayed and finally, during digit 1 time, a,b,g,c and d are enabled and the display indicates the number 3. To prevent flicker and blurring of numbers when going from one digit to another, there is a short interval, which the eye cannot follow, called the interdigit blanking time, when all digits are blank. Also, the complete word time (the interval to scan all six digits) is short enough so that the eye does not follow the individual digits going on and off and the display appears completely stable. The rate of scanning by the way, is controlled by an oscillator within the chip.

To put information and commands into the chip we use a somewhat similar multiplexing scheme. Fig. 4 shows this hookup. In this case we apply the digit scanning signals to

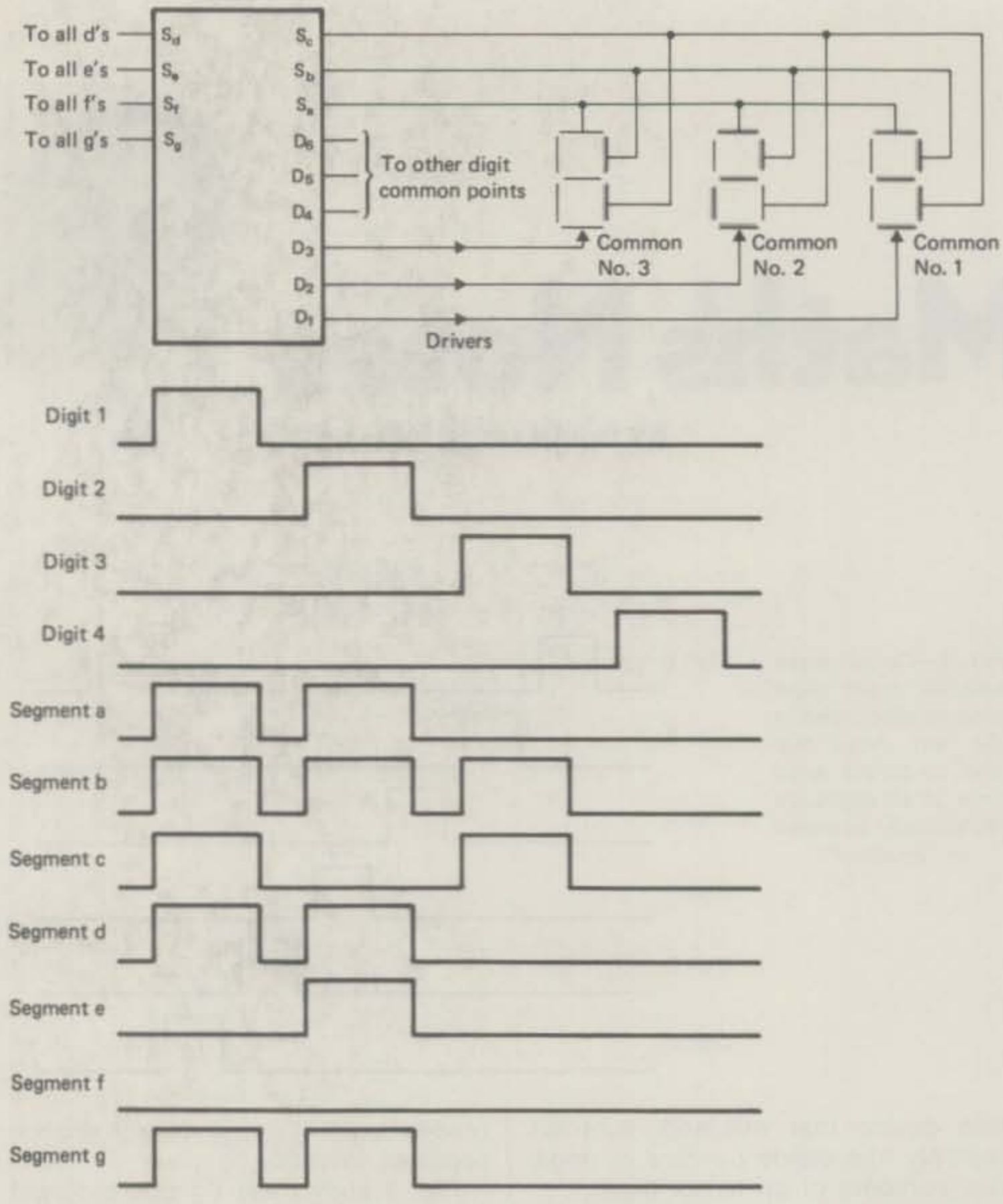


Fig. 3—Logic signals to display "123". Note that the digits go from right to left and also that digit 4, which is blank, does not have any segment signal during its enabled time.

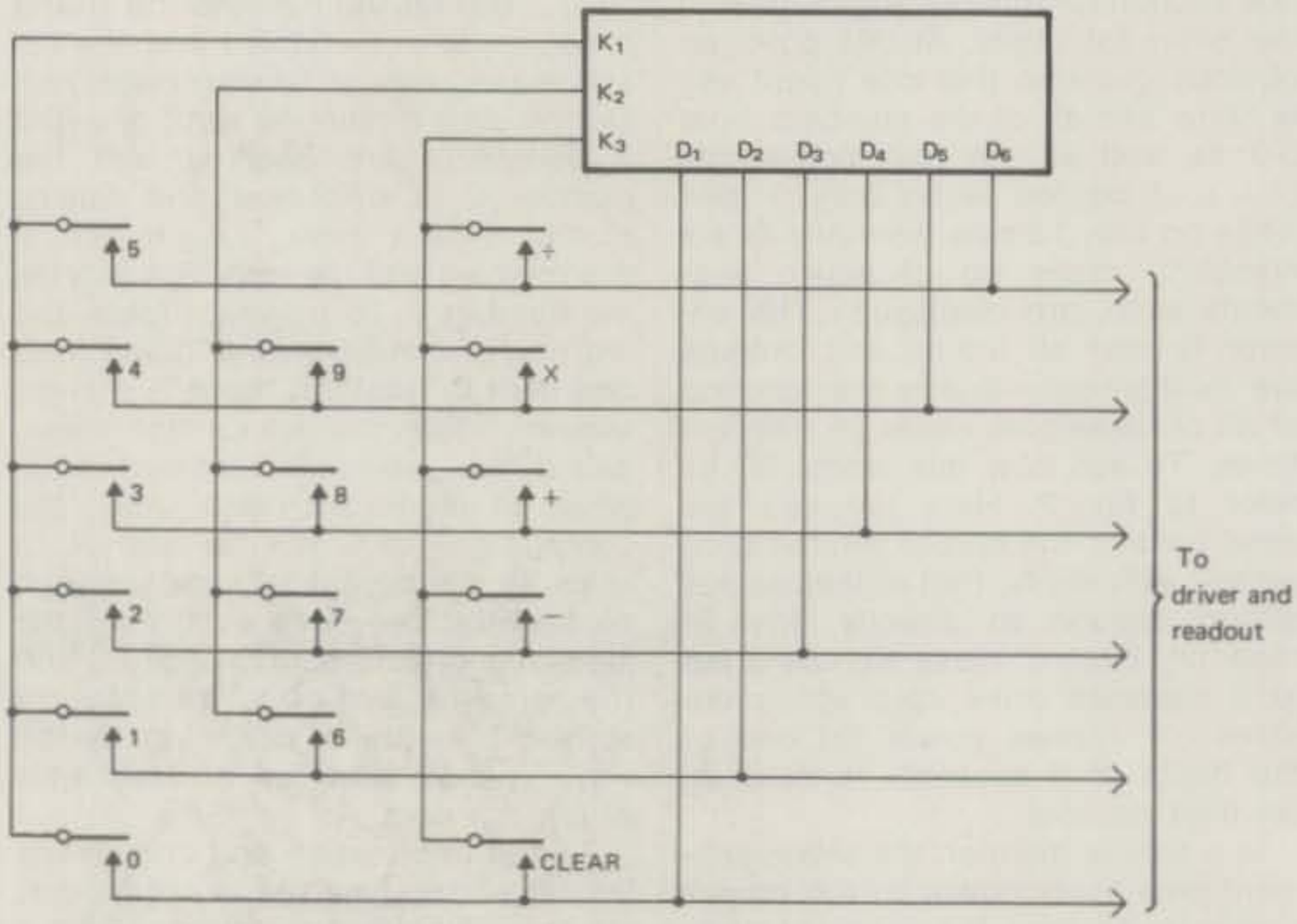


Fig. 4—Input hookup for calculator chip. Note that the digit scanning signals are used in the multiplexing scheme to drive the three inputs.

one of the three inputs, thereby selecting either the numbers or commands to been entered into the chip depending on which digit signal goes to which input. One other feature present in the chip is circuitry that eliminates errors caused by false pulses or noisy push buttons. The way the chip does this is to not recognize any input signal that does not last for more than 8 word times. This allows the use of just about any push button switch or keyboard made today.

At this point those who are interested in applying this device should obtain a chip with data sheet, driver and readout from one of the various surplus dealers advertising in *CQ* or elsewhere and begin investigating the various waveforms and input combinations to gain "hands-on" familiarity with the device. Wiring is not at all critical and accidental. Wrong connections will not damage the chip as it is a CMOS device and short circuit proof. Be sure however, not to plug it into a circuit with power on.

Be certain to also not exceed its maximum Vcc valve which is 12 volts as this *will* destroy the device. Also when using a power supply, the B+ must come up to its final value very rapid. This means that you may have to install a switch in the + lead of the power supply for proper operation of the chip. The normal B+ range for proper operation of the MM5736 is 6.5 to 9.5 volts so you can use common transistor radio batteries instead of a power supply if you wish.

Fig. 5 is a complete schematic of a calculator utilizing the MM5736 which you may wish to build. Some of the sources previously mentioned have complete keyboards, keyboard switches, and even cases intended for this particular calculator circuit.

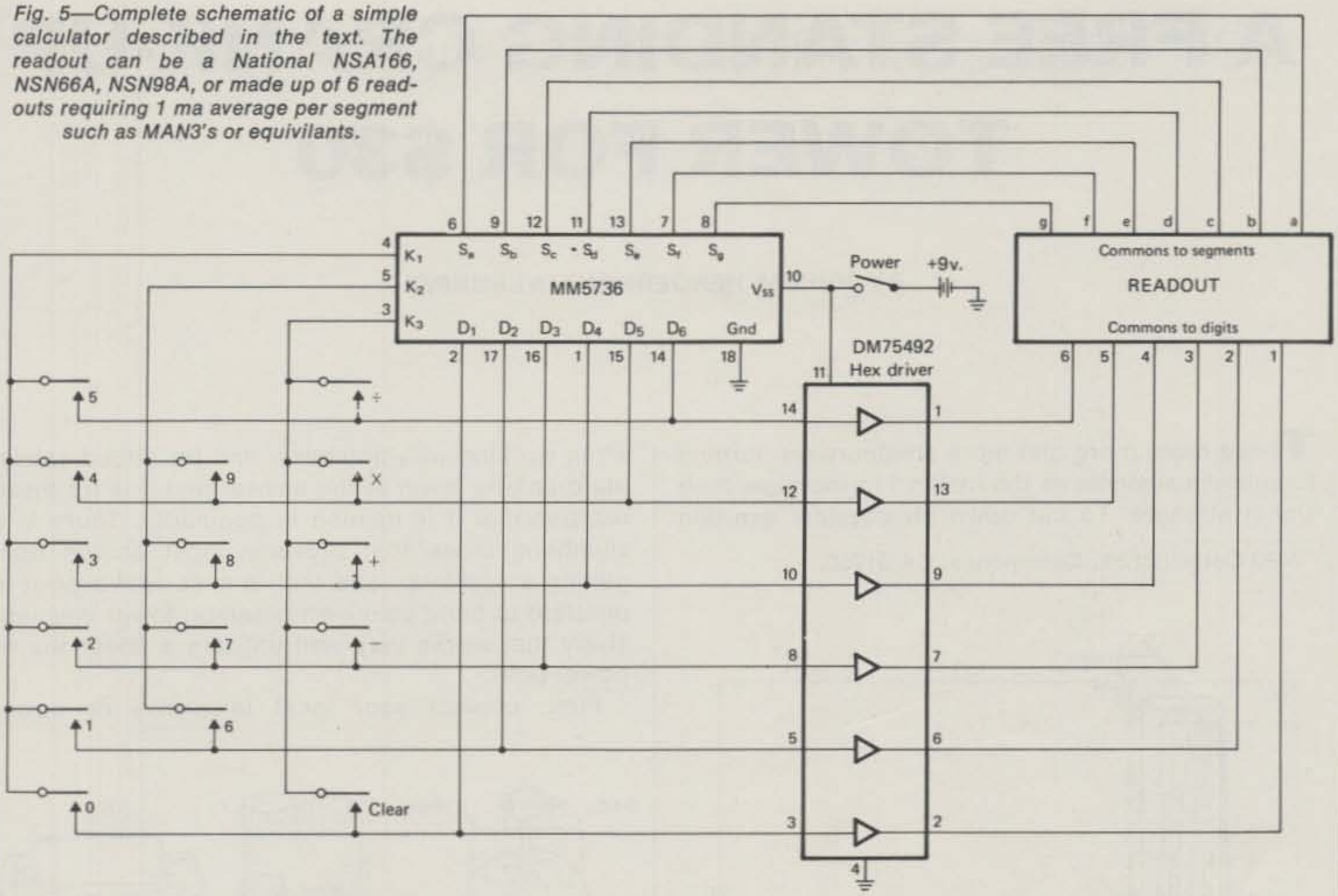
Next month we will take a look at ways of interfacing the calculator chip without a keyboard—in other words from other equipment. Also, we will discuss two examples of non-calculator applications of the calculator chip.

73, Irwin, WA2NDM

References:

1. Data Sheet, MM-5736, National Semiconductor.
2. National Semiconductor Application Note AN112.

Fig. 5—Complete schematic of a simple calculator described in the text. The readout can be a National NSA166, NSN66A, NSN98A, or made up of 6 read-outs requiring 1 ma average per segment such as MAN3's or equivilants.



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A FREE STANDING CRANK-UP TOWER FOR $30

BY JOHN M. HENDERSON*, WB6MKP/7

These days, more and more amateurs are turning to antenna systems as the method to increase their signal strength. To cut down on physical exertion while working with antennas, and for added safety, the crank-up tower is the answer and it is for these reasons that it is gaining in popularity. There is a stumbling block that prevents most people from getting a crank-up, and that is cost. However, it is possible to build your own crank-up tower inexpensively that works very well utilizing a telephone or power pole.

*7490 Carnelian St., Cucamonga, CA 91730.

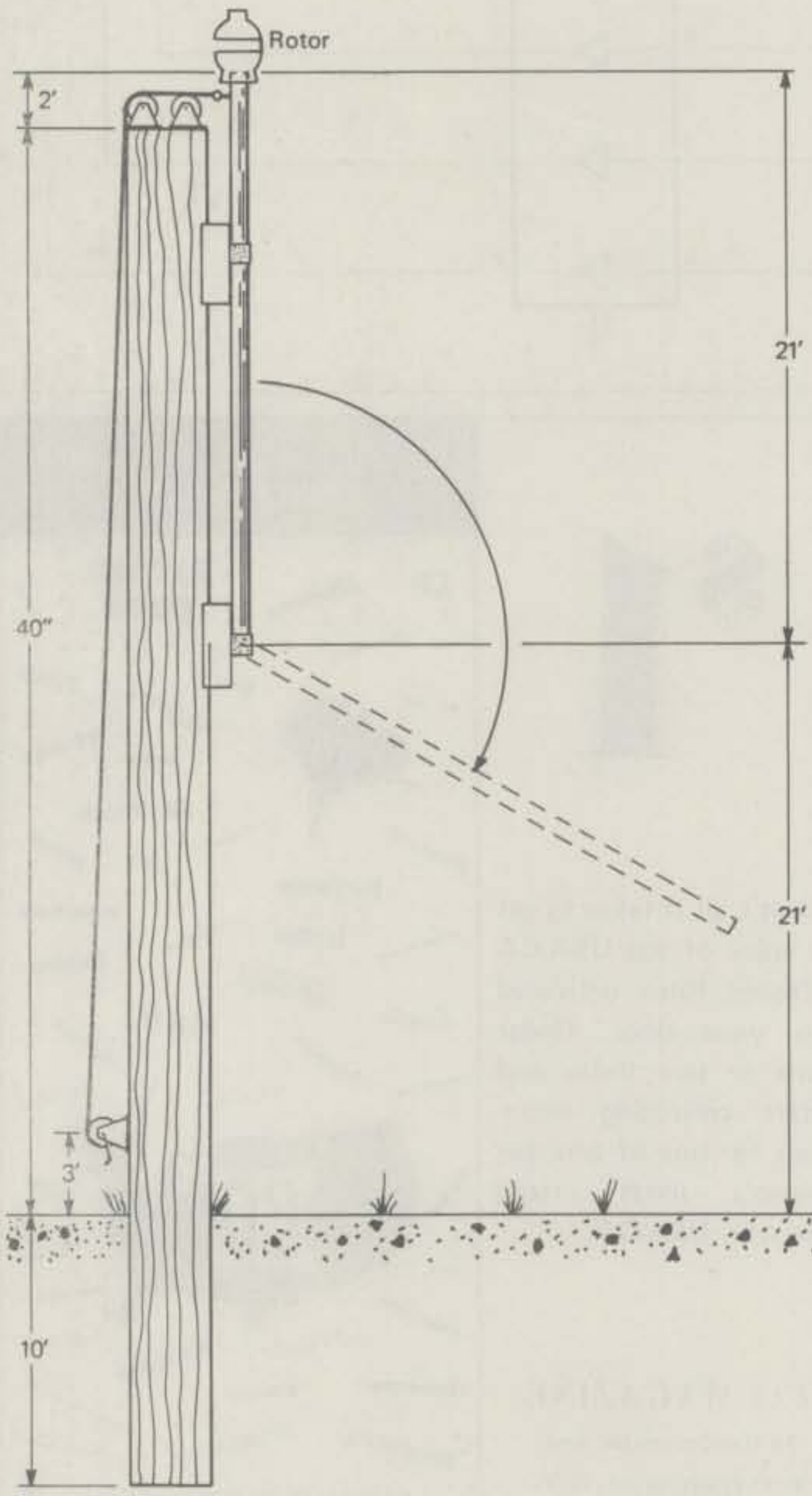


Fig. 1—Overall view of the telephone tower. Dimensions are approximate and can be varied to fit your own needs.

First, contact your local telephone or power company's construction yard and ask if they have any used poles. They usually have a few on hand since in many areas telephone and power lines are going under ground. This makes the old poles surplus. In my case the telephone company was happy to give me the pole. If you are able to get hold of a pole, choose the size you want (I used a 50′ pole) and then ask them if they would also drill the hole and set it for you. If the place where you want the tower is in an accessable place for a very large truck, they just might drill it for you. Be sure to put the hardware on while the pole is on the ground. When they do set it, have them put pole steps in all the way up the pole, and be sure they

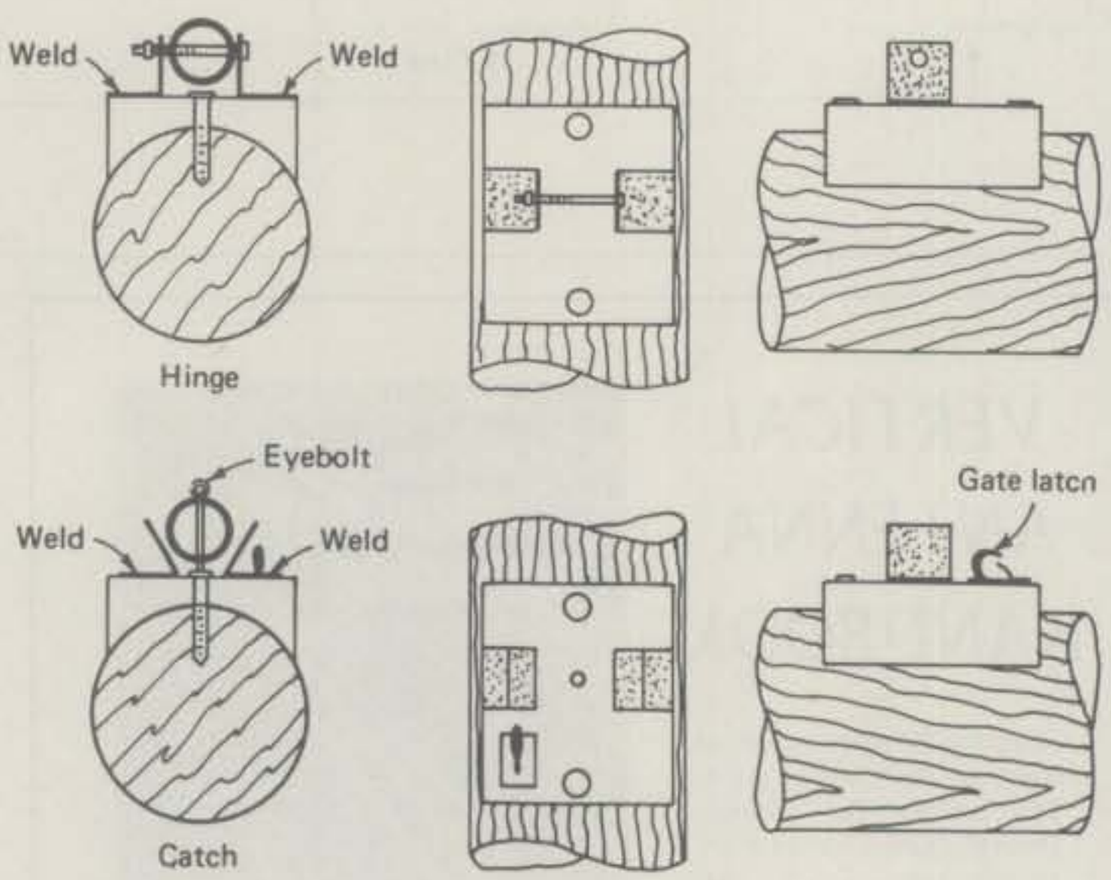
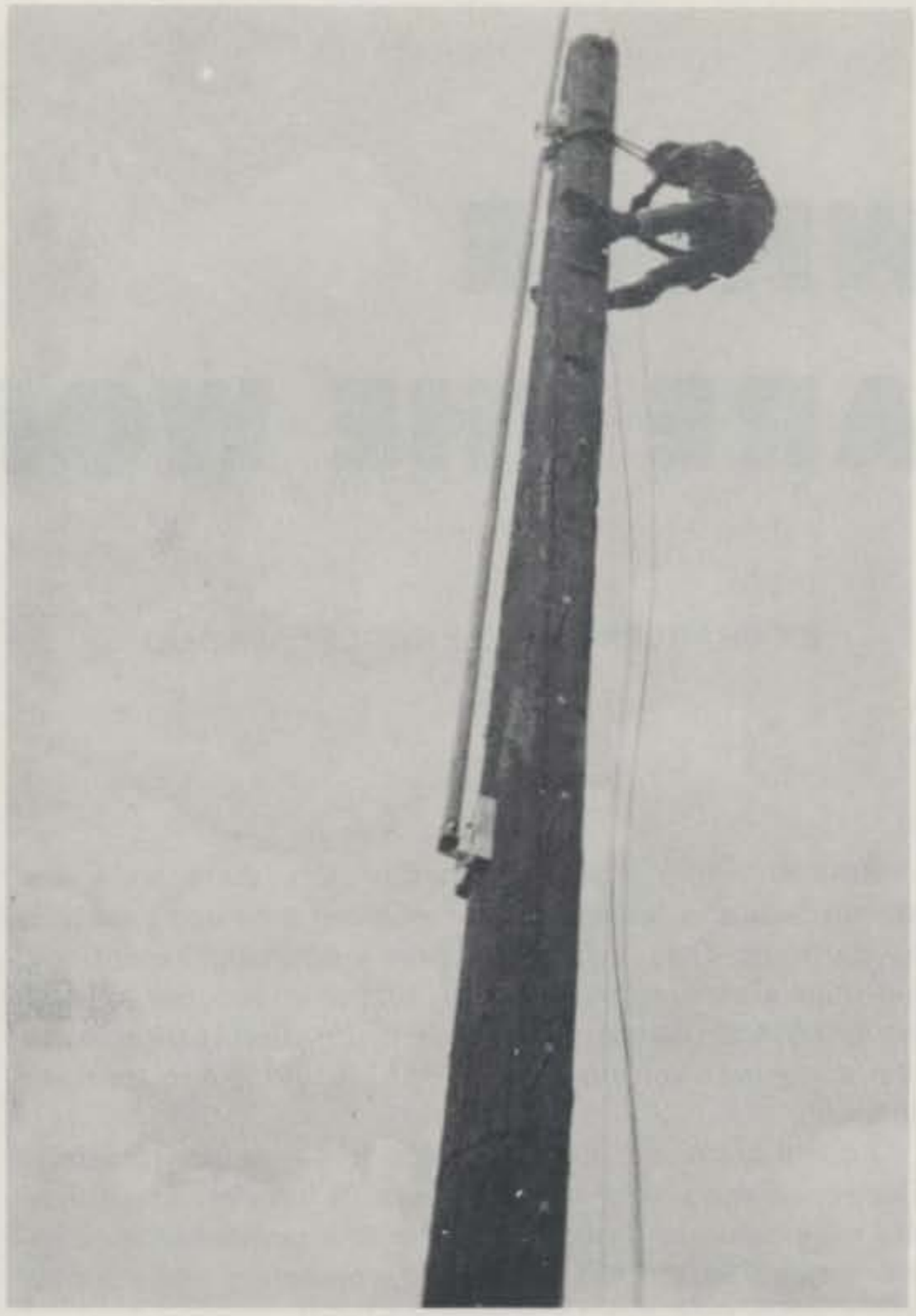


Fig. 2—The author's method of hinge construction for the free standing tower.

Here the author climbs up the free standing tower. Pole steps run up the entire length of the pole. Notice the safety strap he is using.



align it so that the antenna comes down to an open area.

The approximate dimensions are shown here (fig. 1) but will depend on the size of pole you get and how deep you set it. The other two major items of expense are the small boat winch and the 21 foot by 2 inch O.D. galvanized steel pipe. The cable used is ⅛ inch or larger, depending on antenna weight, which pulls across two deck-mount pulleys at the top of the pole and attaches to the pipe through an eye bolt in the pipe. The pipe itself is mounted on a hinge about half way up the pole.

The hinge was constructed from two heavy duty ¼ inch steel angle braces, welded on a steel plate found in a junk yard (fig. 2). It probably could be mounted directly to the pole if no plates could be found (fig. 3). A ⅜ inch case hardened bolt is used to hold the pipe as the hinge.

Towards the top of the pole, to support or catch

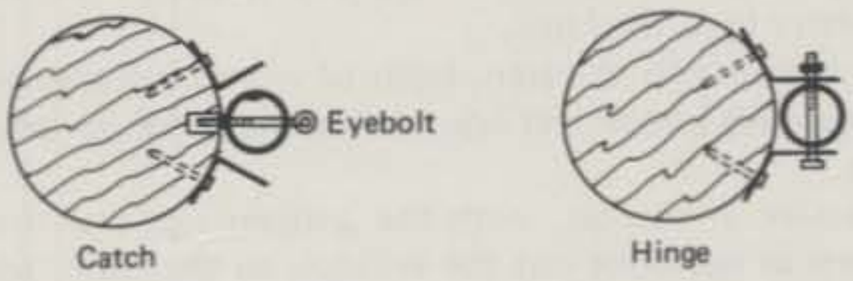
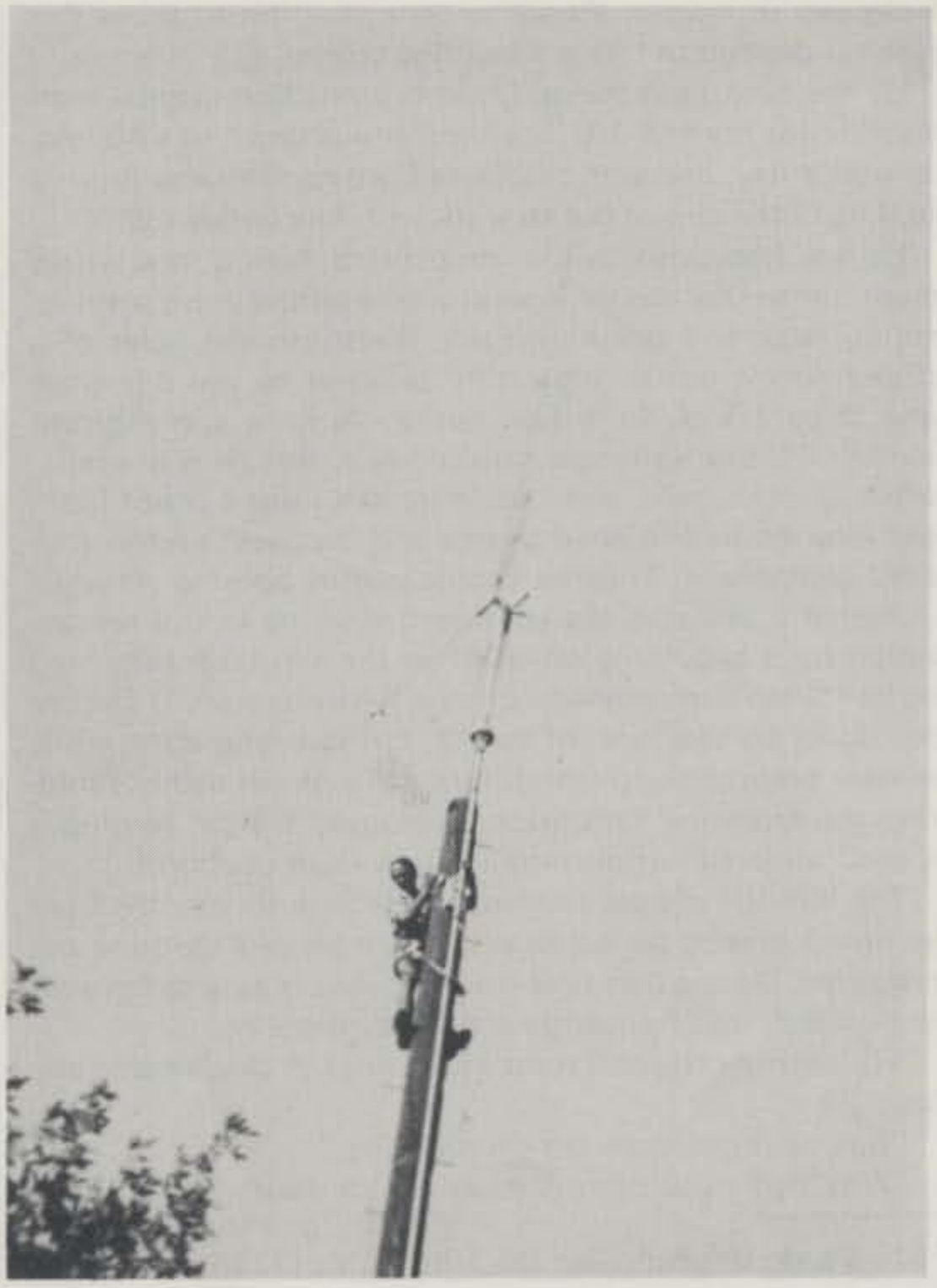


Fig. 3—An alternate method of hinge construction.

the pipe, another plate is mounted with two more angle braces welded on and bent slightly to form a V-catch for the pipe (fig. 2). These two angle braces are spaced about one inch apart and between them a hole is drilled to accomodate the straight end of another eye bolt. Being inserted in this hole it acts to prevent any additional side play of the pipe in its upright position. The "eye" of the eye bolt is convenient for attaching a rope to assist in guiding the pipe and antenna up and down. As an added safety feature, install on this plate an ordinary gate latch to lock the pipe into position at the top. So if for some reason the cable breaks or comes loose while the antenna is upright, it won't wall down.

The construction of this tower is not difficult and is just as easy to operate. The cost will actually depend upon the parts, but should run about 20 to 30 dollars. The tower described here has been in operation for nearly two years. It has yet to fail and there is no reason to think it will not hold up for many years. ■



Both the author and his beam sit proudly atop the $30.00 free standing tower.

WHERE ARE THE WOMEN?

BY CHARLENE BABB KNADLE*, WB2HJD

Amateur radio is a man's hobby. Oh, there are a few women here and there who are hams, but they don't seem to do anything. They just talk. (There are notable exceptions, and there are plenty of men who "just talk" too, but most of the fixers and designers are men.) I, too, find it pleasant to hear a woman's voice on the air, but I would like to see them do more.

I could blame our society. Maybe it is at fault, ultimately. Electronics and similar technical pursuits have been traditionally male-dominated occupations, with interested women encountering resistance even in the counseling and training stages, when they seek to enter these fields.

I do not believe that there is any inherent incapacity for electronics in women. Partly to do a small bit to prove this myself, I decided to tackle a building project.

By the time I got the parts and construction manual from Heathkit for my HW-101, my toddler was down to a 45-minute nap a day, and was otherwise keeping the same hours I did. I had little choice but to work with him beside me.

He was fascinated by the components, luckily, and would amuse himself for ten minutes at a time sitting in his playing/feeding table and poking resistor leads into the holes of a printed circuit board. I guess he believed he was doing the same thing I was. In a few weeks when he was eighteen months old, this no longer satisfied him. But he was a mild, non-destructive child, and I could let him shine a pencil flashlight into the half-finished chassis and "inspect" each newly-added component. Then he cooperated by backing off while I soldered a new one. We continued working in this see-saw fashion for a good long while before the inevitable happened and he started demanding to use the soldering iron. (I put my foot down on that one, of course, but not long after, while we were preoccupied with visitors, he took his daddy's soldering gun from the ham shack, unplugged the t.v. to plug it in, and "soldered" a hole into a nearby chair cushion.)

The HW-101 did get finished, but it took six months from the time I opened the package until the trouble-shooting was completed. During that time it wasn't always easy to fend off my husband, who frequently walked by drooling.

"This is *my* project. I want to do all of it. Don't come any closer."

"But you're so slow. It's excruciating."

"Why don't you order something for yourself. But while you're here, if you will, you can tell me which of these things is an N.P.O. capacitor, so I don't have to look it up."

And so it went. But it was gratifying to learn, when it was all over, that the only "glitch" was the fact that I had put so little solder into the center pin of a phono jack that it didn't make contact anywhere.

I didn't finish a bit too soon. Kids go through stages, and my mild, usually-cooperative little boy suddenly turned into an aggressive little monster.

Now I have two children, both of whom want to participate in turning knobs and controlling the mike, or anything else I do.

It's easier in the car, with the 2-meter rig. The five-year old listens as he looks out the window in the back, and the terrible-two-and-a-half year old can't reach the mike from her car seat, unless I hand it to her. (I let them talk when the rig is off.)

Yesterday I turned on the mobile rig just in time to hear an O.M. make this comment: "Hey, guys; I've got my four-year-old in the car with me, and I have to drive and watch him, and that's about all I can handle. I'll catch you some other time."

It was a relief to know that some of the "other half" understands part of the reason why women generally accomplish so little in amateur radio. ■

*316 Vanderbilt Parkway, Dix Hills, N.Y. 11746

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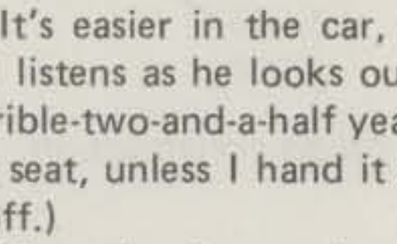

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JOHN A. ATTAWAY, K4IIF, ON

DX

During May and June, the *CQ* DX Award's Advisory Committee considered two matters of considerable interest to the DX fraternity. These were a new nomination for the DX Hall of Fame and a special new plaque for those who have demonstrated excellence in the WPX Award program.

Full details regarding the new prefix hunter's plaque will be announced in either the September or the October issue, with the award to be effective Jan. 1, 1977. Contacts back to 1945 will be accepted, as starting the award from scratch places too big a QSL burden on the operators of rare stations and their QSL Managers. Details of the new DX Hall of Fame recipient follow:

DX Hall of Fame

The newest recipient of the DX Hall of Fame award is *CQ's* own Frank Anzalone, W1WY, who has been parent and guardian of the very successful CQ Worldwide DX Contests for 20 years. Frank's name first appeared in the Contest Editor slot of the masthead in the August, 1956 issue of *CQ*.

Frank was proposed for DX Hall of Fame by Robert W. Entwistle, W1MDO, and as Robert's letter of nomination describes Frank's achievements so clearly, we would like to quote it directly:

"Dear John:

"I am writing to you about a mutual friend of ours and thousands and thousands of other amateur radio operators throughout the world, namely, Frank Anzalone, W1WY.

"Having known Frank for many years, I have witnessed in him a tireless dedication to the amateur radio fraternity, particularly in the area of DX and DX contesting. I don't have to tell you about the professional manner in which he has handled the *CQ* Worldwide Contest over the years with the result that it is now the most popular DX contest worldwide.

"As a result of Frank's efforts, many DXpeditions were spawned, thereby making rare and often new countries available to the amateur fraternity.

"I know that Frank personally makes DX contest information available to other publications in other countries. His efforts to improve communication with radio associations throughout the world are evidenced by the fantastic increase in participation by U.S.S.R. amateurs in the CQ Worldwide Contests.

"Frank has acted as a mediator and clearinghouse for interpretations relating to how multi-operator, multi-transmitter stations should be treated in contest work. This is no easy task since a delicate balance must be maintained. Too strict and DX activity is stifled; too easy and all reasonableness is lost.

"Frank's honesty and sense of fair play guide him in every decision he makes relative to DX and DX contest activity.

"I know that Frank puts aside his own personal time when it comes to helping someone out who writes to him relating to the *CQ* Worldwide contests or any other aspect of DX contesting.

"For all of these reasons and many others, I would like to make this a formal request that Frank be considered for the DX Hall of Fame, and I hope that you will be able to present my feelings to the *CQ* DX Award's Advisory Committee."

Needless to say, we did present the nomination to the Committee, and we are pleased to report that the Committee concurred. We are happy to add the name and call of Frank Anzalone, W1WY, to the following list of distinguished recipients of the DX Hall of Fame Award:

Gus M. Browning, W4BPD
Nov. 1, 1967

John M. Cummings, W2CTN
March 23, 1968

Stewart S. Perry, W1BB
Aug. 16, 1968

*P.O. Box 205, Winter Haven, FL 33880.

Lele, HB9AMY, operating in the Jamboree with a Boy Scout group "San Gottardo" from Lugano-Viganello.

The station of HB9AMY. Lele de Filippis, of Lugano, Switzerland during operation by the Boy Scouts during last year's Jamboree.

The CQ DX Award Program

SSB	C.W.
439...WB4ASV	208...DL7KL
440...VE7VT	209...JH1VRQ

Endorsements

WA31KK...310 ON4QX...320 WA8TDY...275

Complete rules and application forms for the *CQ* DX Awards program can be obtained by sending a business size, No. 10, envelope, self-addressed and stamped to: "CQ DX/WPX Awards", Box 3388, San Rafael, Calif. 94902.

Lele de Filippis, HB9AMY (left) of Lugano Switzerland with Clay Regazzoni (right), steersman of "Formula 1."

Richard C. Spenceley, KV4AA
March 1, 1969

Danny Weil, VP2VB
Sept. 15, 1969

H. Dale Strieter, W4DQS
May 23, 1970

Stuart Meyer, W2GHK
Oct. 31, 1970

Martin Laine, OH2BH
Jan. 22, 1972

C. J. (Joe) Hiller, W4OPM
March 30, 1973

Ernst Krenkel, RAEM
April 14, 1974

Frank Anzalone, W1WY
June 19, 1976

De Extra

Status of "West Berlin"—On pages 22 and 23 of the March, 1976 issue of *CQ*, Walter Schroeder, WB5OXC, presented a case for separate country status for the city of Berlin according to DXCC Rule 1, separate and distinct administration, and Rule 3, intervening territory greater than 75 miles. This case has been challenged by Dr. Jurgen Röttger, DJ3KR, DX Manager of the German Amateur Radio Club. Dr Röttger's letter states the following:

"We are sure that you appreciate and will publish the following corrections:

"1.) The author seems to talk about Berlin West, but wrongly writes 'Berlin' which in the common political nomenclature means a considerable difference.

"2.) The author tries to prove the applicability of rule point 3 of the DXCC criteria which applies only to the case of a country . . . which has a *common government or administration* but which is . . . separated . . . by a minimum of 75 miles of foreign land, but inconsistently applies rule 1 which provides that an area, by reason of government or a distinctly *separate administration* constitutes a separate country. Actually, rule 3 does not apply as the minimum distance between the location 52°59.8′ north, 11°34.0′ east in the Federal Republic of Germany, and the location 52°53.4′ north, 13°9.0′ east in Berlin West, is only 66.34 statute miles.

"3.) In further contradiction to the author's assumption that shortly after the U.S. formally recognized the German Democratic Republic, East and West Germany were counted separately for DXCC, it should be pointed out that the exact date is the date corresponding to the seating of the 2 Germanies in the U.N. The statement of a distinctly separate administration or a non-common government which led to the consequent decision of the A.R.R.L. Awards Committee, thus, implies a seating in the U.N. which is not true for Berlin West.

"4.) It is recalled that the fact of a common government and administration for Berlin West and the Federal Republic of Germany — concerning the telecommunications sector — is documented by the license coverage specifications which incidentally have to be applied to decisions on behalf of the amateur radio service. These state that permission to operate an amateur radio station within the Federal Republic of Germany includes Berlin West.

"As a final conclusion, neither rule 1 nor rule 3 of the DXCC criteria are applicable for proving Berlin West to count as a separate DXCC country."

De Extra makes the following, hopefully objective comments:

1.) The entity in question is not Berlin per se, as part of that city, the "Eastern Sectors" are in East Germany. Whether the entity in question is properly called "West Berlin," "Berlin West" or the "Western Sectors of Berlin," as stated in the Quadrapartie Agreement, is perhaps subject to interpretation.

2.) If it is only 66.34 miles from the nearest point in the Federal Republic of Germany to "West Berlin," then DJ3KR is completely correct in asserting that Rule 3 does not apply.

3.) The arguments involving Rule 1 remain muddled, and a case for separate status could reasonably be discussed. The Quadrapartie Agreement of Sept. 3, 1971, cited by WB5OXC, states that the Federal Republic has ties to the Western Sectors of Berlin, but that these Sectors are not a constituent part of the Federal Republic and are not to be governed by the Federal Republic. It appears from DJ3KR's letter that the authority to issue radio licenses in the Western Sectors has been delegated to the Federal Republic as one of its "ties," but unless there is a superceding agreement since 1971, the Western Sectors are governed by the U.S., Britain and France.

If you have feelings in the matter make them known to the League's DXCC Advisory Committee.

From the Mailbag

de W1JFL—Please announce in the August, 1976 *CQ* Magazine DX Column that the Northeast DXCC Banquet will be held on Oct. 2, 1976

Borge Nielsen, OZ7BW, keying the fully-equipped Drake station at his QTH in Ny Solbjerg, Denmark. Borge holds C.W.—Phone WAZ No. 3940.

The WPX Program

Mixed

527...YU4EBL 528...YU5CYZ

2XSSB

908...F5RC 910...IØRKR
909...I4PGD

CW

1482...F6CRT 1484...DK7RW
1483...WA1KVM

VPX

104...Paul Bailly DM-3367/L

Endorsements

350 F6CRT, I4PGD, YU4EBL
400 F6CRT, I4PGD, YU4EBL
450 F6CRT, G3DPX, I4PGD, YU4EBL, YU5CYZ
500 G3HB, YU4EBL
550 W7CUJ, YU4EBL
600 W7CUJ, W9KDX, YU4EBL
650 W7CUJ, YU4EBL
700 K6ZDL, WAØCPX, YU4EBL
750 K6ZDL, WAØCPX, YU4EBL
800 G5GH, K6ZDL, WA5VDH, WAØCPX, YU1AG, YU4EBL
850 K6ZDL, W3DJZ, W3YHR, WA6TAX, YU4EBL
900 G2GM, DK2BI, K6ZDL, WA2EAH, ZL3NS
950 DK2BI, ZL3NS
1000 DK2BI, I4ZSQ, K6SDR, ON4QX, PAØSNG
1050 W4WSF
1100 I8KDB, WB2FMK
1150 WA4KZG
1200 DJ7CX, W4WSF, WB2FMK, W8LY
1600 W4LRN
160 Meters DK2BI
80 Meters ZL3GQ
10 Meters G5GH, W8TDY, ZL3GQ

North America	ZL3GQ
South America	ZL3GQ
Europe	DK7RW, LX1MK, YU5CYZ
Asia	WA2EAH, ZL3GQ
Oceania	JA2IU

Complete rules for WPX may be found on Page 67 of the February 1972 issue of *CQ* Magazine. Application forms may be obtained by sending a business size envelope, self-addressed and stamped, to 'CQ DX/WPX Awards, Box 3388, San Rafael, Calif. 94902.

at the Waltham, Massachusetts Holiday Inn. Additional information can be obtained from Mike Samarco, W1JFL.

de W3QW — I especially enjoyed your list of DX games in *CQ* for February, 1976. Working European DX is no big deal, BUT try it in those 10 groups, and its something else. Please print some other ideas like that. (The idea for 10 European groups originated with Bruce Hoag, W2OGE, and he has others just as good. Get in touch with Bruce for new approaches to DX. — K4IIF)

de National Capital DX Association —The National Capital DX Association (NCDXA) and the Amateur Radio Research and Development Corporation (AMRAD) are teaming together to provide a DXciting weekend—*DXPO 76* — Sept. 25-26, 1976 at the newly constructed Ramada Inn at Tysons Corner near McLean, Virginia. There is easy access from Interstate 495, the Capital Beltway. The program will include a DX Technical Symposium geared to the DXer, contact Paul Rinaldo, K4YKB, 1524 Springvale, Ave., McLean, VA 22101 for details, plus sessions on DXpeditions, Contesting, Antennas, Satellite DXing and others. To get on the DXPO 76 mailing list, contact Rosie Lamb, WA3NGS, Route 1, Box 297, White Plains, MD 20695.

More On the Old-Type I.R.C.'s

In the March issue of *CQ*, the DX column reported that the two older types of International Reply Coupons (I.R.C.'s) would not be accepted for redemption by the postoffice after Dec. 31, 1976. This information, which had been gleaned from U.S. Postal Bulletin 21010, prompted a flurry of activity by those who felt that this ruling was in violation of Universal Postal Union (U.P.U.) regulations. Geoff Watts, publisher of the *DX News-Sheet,* took the matter up with the English postal authorities in London who in turn referred the matter to the U.P.U. in Geneva who communicated with U.S. postal officials in Washington.

As a result, a letter was written to postal headquarters in London by the U.S. Office of International Postal Affairs which indicated that the U.S. Post Office would abide by U.P.U. regulations and would continue to accept the old style I.R.C.'s after Dec. 31, 1976. Geoff Watts has a copy of this letter on file. Many thanks to Geoff for his actions in this matter which are beneficial to all DXers.

And Still More On The I.R.C. Situation

An informational letter regarding I.R.C.'s was recently received from the postoffice by James Spencer, W0FHE, and the highlights published in the *West Coast DX Bulletin.* The following excerpts from this letter help explain the situation, particularly the recent increase to 42c per I.R.C.:

1. The U.S. is one of 154 member countries in the U.P.U., an organization established to facilitate the exchange of mails between countries and to provide uniformity in postal service. The U.P.U. adopts regulations on surface postage rates which establish upper and lower limits. The upper limit is the basis for the cost of an I.R.C.

2. The I.R.C. shall be on sale in member countries, at a selling price not less than one gold franc.

3. Reply coupons shall be exchangeable in any member country for the minimum postage prepayable

Naoki "Nao" Akiyama, JH1VRQ, hit the airways in May, 1969 after logging 316 countries as JA1-3989. He was QRP without a beam until a year ago, but now has a TH3MK3 at 18 meters. "Nao" has been awarded WAZ, Single Band WAZ on 20 meter phone, WPX Mixed, WPX S.S.B., the CQ S.S.B. DX Award with endorsements to 200 countries and the CQ C.W. DX Award.

on an unregistered letter sent abroad by surface mail. When a sufficient number of reply coupons are presented, administrations shall be required to supply postage stamps for the minimum postage prepayable for dispatch by air.

4. Notwithstanding, postal administrations shall be permitted not to undertake the sale of I.R.C.'s, or to limit their sale.

5. The U.P.U. prescribed a minimum charge of one gold franc (approximately 40 cents) for coupons because the upper limit charge for a surface letter not exceeding 20 grams (one ounce avoirdupois), established by the U.P.U., is one gold franc.

6. Prior to January, 1975 the settling of accounts for I.R.C.'s was handled between countries on a bi-

One of the top young DXers of Europe is Pekka Sunila, OH2BMG, of Helsinki, Finland Pekka now holds WAZ among his many DX awards.

lateral basis, but effective that date accounts are settled for all member countries by the U.P.U. in Bern, Switzerland. All settlements are based on a coupon value of one gold franc.

7. The 2¢ differential covers a portion of the cost of purchasing, transportation, distribution and accounting. Printing and transportation to the U.S. counts for 1¢ per coupon.

8. In 1974 the U.S. proposed a special I.R.C. to prepay air letter postage from all countries, but it was not acted upon favorably. However, the U.P.U. did set up a committee to study the feasibility of such a coupon.

Hopefully this has increased your knowledge re the I.R.C., a little coupon which functions as an international currency for DXers.

Rare Prefix Notes

AG2—The QSL address for AH3DV/AG2, Canton Island, is P.O. Box 1333, Pago Pago, American Samoa 96799, or via WA6QFO.

AI4—AI4ARU was a special call used at the IARU Region II conference in Miami. QSL to W4WYR, 2280 N.W. 3rd. St., Miami, FL 33125.

Rich, EP2DB, gave many a happy DXer a new one during his tour in Ethiopia. (Photo courtesy Ed, W3JZJ)

CQ DX Honor Roll

The *CQ* DX Honor Roll recognizes those DXers who have submitted proof of confirmation with 275 or more countries for the mode indicated. The ARRL DXCC Country List, less deleted countries, is used as the country standard. Total number of current countries on the DXCC as of this listing is 321. Honor Roll submissions must clearly state that the submission is for the Honor Roll. Those wishing to be placed on the *CQ* DX Award Honor Roll should request the Honor Roll Check list.

CW

W6PT	319	W4YWX	312	A6GLD	306	K6LEB	302	WA8DXA	296
W6ID	317	W8LY	310	W6ISQ	303	VK3AHQ	301	W6NJU	294
K6EC	316	W4IC	309	W9DWQ	305	W4BQY	299	WA6MWG	293
W8KPL	316	ON4QX	308	WØAUB	304	DL3RK	298	WA6EPQ	288

SSB

W2TP	319	W6REH	313	W9KRU	308	K6AQV	299	DJ7CX	287
WA2RAU	317	K4MQG	312	I8YRK	307	WA6GLD	299	K1KNQ	287
K2FL	317	WA2EOQ	311	VE3GMT	307	HP1JC	298	0E3WWB	287
W3AZD	317	W2QK	311	K3GKU	307	WØYDB	298	SP5BSV	287
G3FKM	316	W6EUF	311	F9MS	306	K4HJE	297	DL1MD	286
TI2HP	316	W6RKP	311	W9QLD	306	W6FW	297	W6TCQ	286
W2RGV	316	K6WR	311	KH6BB	306	DK2BI	296	K8GQG	286
IØAMU	315	W6YMV	311	XE1AE	306	G3RWQ	295	W3CRE	284
VE3MR	315	W9DWQ	311	YV1KZ	306	W9OHH	295	DK1FW	282
W6EL	315	SM6CKS	311	W6NJU	305	YS10	295	OK1MP	282
DL9OH	314	W3DJZ	309	OE2EGL	305	VE7CE	294	VA7WJ	282
W3NKM	314	K4RTA	309	OZ3SK	305	W8ZOK	293	WB6PNB	282
W4NJF	314	WA6MWG	309	K9WEH	305	WAØCPX	293	K8PYD	282
W9ILW	314	F2M0	308	VE2WY	304	DL6KG	292	WA2VEG	280
SM5SB	314	F9RM	308	W2CNQ	304	WØSFU	291	W6HUR	279
I8AA	313	IØZV	308	G3DO	303	G3KYF	290	W9YRA	277
I8KDB	313	ZL1AG0	308	WA6AHF	303	OE1FF	290	I1WT	275
IT9JT	313	WA3IKK	308	W6KZS	303	WB2RLK	290	VE7HP	275
SM6CWK	313	W6KTE	308	VE3MJ	302	W6FET	290	K6GUY	274
W4EEE	313	W9JT	308	WA2HSX	301	XE2YP	289	WA8TDY	272
W4IC	313	ZL3NS	308	WB6DXU	300	YV1LA	289	K9LUI	271
W4SSU	313	ZS6LW	308	W4WSF	299	WAØKDI	288	G3WW	271

CE9 — CE9AV, active 1400 GMT, Tuesdays near 14110, is on South Shetland Island. QSL to CE2MZ.

CEØ — Cards to Father Dave on Easter Island go to WA3HUP at her new address: Mary Ann Crider, R.D. 2, Box 5A, York Haven, PA 17370.

EQ2—EQ2ITU was used by EP2OD during ITU week, by special permission of the Ministry of PTT om Tehran. QSL to K4OD, P.O. Box 135, Front Royal, VA 22630.

IE9—IE9CBM was operated by I2CBM on Ustica Island. QSL to I2YDX, P.O. Box 4, 21100 Varese, Italy.

JJ — This is a new Japanese prefix series. JJ1ABC is frequently heard working DX.

KC7—KC7LBH was operated by Lee Graves, WA7OBH, to mark the 100th anniversary of the Battle of Little Big Horn which took place June 25, 1876. QSL to Lee at 17 South Chouteau, Hardin, MT 59034.

N4—Cards to special station N4ISC go to W4IMP.

XJ1—XJ3ZZ/1 in May was DX operation from St. Paul Island. QSL to VE3BMV.

4L5—This is a special prefix from the Ukraine (UB5). QSL all 4L stations via the Central Radio Club, P.O. Box 88, Moscow, USSR.

7J1—7J1RL was the special JARL 50th anniversary DXpedition to Okino-Tori Shima, formerly known as Parece Vela and Douglas Reef, a new country for DXCC. This is the first use of the 7J1 prefix to be authorized by the Japanese authorities.

Recent prefix changes are causing problems for some DXers. Note the following:

New Prefix	Country	Former Prefix
C5	The Gambia	ZD3
C6A	Bahamas	VP7
C9M	Mozambique	CR7
D2A	Republic of Angola	CR6
D4C	Cape Verde Islands	CR4
D5A-Z	Liberia	EL
D6A-Z	Comoros	FH8
D7A-Z	Republic of Korea	HL9

Another confusing situation involves the *country* status for the various UK8 club stations. These can usually be deciphered according to the first letter of the suffix as follows:

Common Prefix	Country	Club Station Calls
UH8	Turkomen	UK8B—, UK8E—, UK8H, and UK8Y—
UI8	Uzbek	UK8A—, UK8C—, UK8D—, UK8F—, UK8G—, UK8I—, UK8L—, UK8O—, UK8T—, UK8U— and UK8Z—
UJ8	Tadzhik	UK8J—, UK8R— and UK8S
UM8	Kirghiz	UK8M—, UK8N—, UK8P— and UK8Q—

Thanks to UA9VB and WA9UCE/6 via the West Coast DX Bulletin for this information.

The Hard Zones for WAZ

The most difficult zones for the DXer located in North or South America are those in central and east asia, particularly zones 18, 19 and 23. Also difficult, because of the small number of active stations, is zone 34, the north-eastern zone of Africa.

During the spring and early summer months there was a great deal of

(Continued on page 90)

Dr. Federico Donna, ZP5CF, of Asuncion, Paraguay. Fred has 346 countries confirmed, his XYL, ZP5ET, has 324 and his 21 year old son ZP5CE has 300. The Donna's are undoubtedly one of the world's top DX families. Is there another family group anywhere pushing the 1000 country level? Let us know!

The WAZ Program

Single Band WAZ

20 Meter C.W.

12...JA1UQP

20 Meter Phone

27...JA1UQP

S.S.B. WAZ

1317...K3PUI
1318...I8JN
1319...IØDUD
1320...IØMBX
1321...JA1UQP
1322...JA3URS
1323...DL8YS
1324...YU2RBK
1325...HB9DX

C.W.-Phone WAZ

3959...K9HLW
3960...K7NEQ
3961...I1CCL
3962...K4K4
3963...WA5SDT
3964...W2HHB
3965...OK3JV
3966...JA6AGS
3967...EA7CP
3968...YU2REO
3969...HAØKLU
3970...OZ3XS

Phone WAZ

518...VE6AGV
519...CT1FL

The complete rules for all WAZ awards are found in the May, 1976 issue of *CQ*. Applications and reprints of the rules may be obtained by sending a business size, self-addressed stamped envelope to the DX Editor, P.O. Box 205, Winter Haven, FL 33880.

Serge Soulet, F6AUS, of Saint Maizent L'Ecole, France recently earned C.W.-Phone WAZ No. 3924. Serge demonstrates equal virtuosity with mike or key.

Contest Calendar

BY FRANK ANZALONE, W1WY

See page 47 of this issue for complete rules for this year's *CQ* World Wide DX Contest. No changes have been made and they are the same rules we have been using the past years. We have reached no decision on the interpretation of the single transmitter definition under Sec. III 2a. Therefore the *Exception:* "One—and only one—other band may be used during the same time period if—and only if—the station worked is a new multiplier," will continue to be in effect. More comments and opinions would be helpful and are welcome.

For newcomers not familiar with our contest, the important sections in the rules are Par. III thru Par. VII, and the two sample log forms clearly show how your log should be made out.

There were several errors and omissions in the list of Trophy winners in the phone results in the June issue. A complete revised and corrected list will be made in next month's issue.

Also the announcement of the appointment of new Director of the World Wide DX Contest. Our present Director Fred Capossela, K6SSS finds it impossible to continue because of additional business commitments.

73 for now, Frank, W1WY

Romanian Contest

Starts: 1800 GMT Saturday, August 7
Ends: 1800 GMT Sunday, August 8

This is sponsored each year by the Romanian Amateur Radio Federation Official rules however were received too late to include in last month's Calendar.

You may work other European countries as well as YO stations on each band and mode, 3.5 thru 28 MHz. But a station may be worked only once per band, c.w. or phone.

Catagories: Both single and multi-operator, single and all band in both divisions.

Exchange: RS(T) plus a progressive QSO number starting with 001. YO stations will also include 2 letters denoting their county. (i.e. 569001/-SJ)

Scoring: *For Europeans*—2 points for DX QSOs, 6 points if it's with a YO station. *For others*—2 points for European QSOs, 10 points if it's with a YO station.

Multiplier for Europeans is DX countries and YO counties worked on each band. Others will use European countries and YO counties from each band.

Awards: Certificates to the top scorers in each country in each category. And a Crystal Cup to the overall champion.

Mailing deadline is September 1st to: Romanian Amateur Radio Federation, P.O. Box 1395, Bucuresti 5, Romania.

TOPS 30 C.W. Contest

Starts: 0001 GMT Sunday, August 15
Ends: 2400 GMT Saturday, August 21

This year's contest is in celebration of the TOPS C.W. Club's 30 years of c.w. activity. Its a week long affair and of course on c.w. only.

Exchange: RST and TOPS number for members. A progressive QSO number for others.

Points: Contacts within one's own continent 1 point, with other continents 3 points. And 25 points if you contact the HQ station. (It is hoped that a special call sign will be issued for the contest, possibly in the GB series)

Frequencies: Lower portion of all c.w. bands, 3.5 thru 28 MHz.

Deadline for logs is Sept. 30th and they go to: Peter Lumb, G3IRM, 14 Linton Gardens, Bury Saint Edmunds, Suffolk IP33 2DZ, England.

Kentucky QSO Party

Starts: 0000 GMT Saturday, August 28
Ends: 2400 GMT Sunday, August 29

This one is again organized by the Blue-grass A.R.C. of Lexington. The same station may be worked on c.w. and one other mode per band.

Exchange: QSO no., RS(T) and QTH. County for Kentucky; state, province or country for all others.

Scoring: One point per contact. Kentucky stations use states, provinces and countries worked for their multiplier. Others use Ky. counties worked. (max. of 120) There is also a power multiplier of 1.5 for stations using 250 watts or less input.

Final score: QSO's × QTH multiplier × Power multiplier if any.

Frequencies: Lower edges of Gen-

Calendar of Events

	Aug. 7-8	Romanian Contest
**	Aug. 7-8	10-10 Net Summer Party
**	Aug. 14-15	European C.W. Contest
	Aug. 15-21	TOPS 30 C.W. Contest
*	Aug. 21-22	SARTG RTTY Contest
*	Aug. 21-22	Big 15 QSO Party
*	Aug. 21-23	New Jersey QSO Party
*	Aug. 21-23	QRP ARCI Contest
*	Aug. 28-29	All Asian C.W. Contest
*	Aug. 28-29	Arizona QSO Party
	Aug. 28-30	Kentucky QSO Party
*	Sept. 4-5	Albatross SSTV Contest
*	Sept. 4-6	Four Land QSO Party
**	Sept. 11-12	European Phone Contest
	Sept. 11-12	Pennsylvania QSO Party
	Sept. 11-12	Washington QSO Party
	Sept. 16-18	YLRL "Howdy Days"
	Sept. 18-19	VE/W Contest
	Sept. 18-20	Maryland/DC QSO Party
	Sept. 18-19	Scandinavian C.W.
	Sept. 25-26	Scandinavian Phone
	Sept. 25-27	Delta QSO Party
	Oct. 2-3	California QSO Party
	Oct. 2-3	VK/ZL/Oceania Phone
	Oct. 9-10	VK/ZL/Oceania C.W.
	Oct. 9-10	RSGB 21/28 MHz Phone
	Oct. 16-17	Boy Scouts Jamboree
	Oct. 16-17	RSGB 7 MHz C.W. Contest
	Oct. 17-18	Manitoba QSO Party
	Oct. 30-31	**CQ WW DX Phone Contest**
	Nov. 6-7	RSGB 7 MHz Phone
	Nov. 20-21	Austria 160 Contest
	Nov. 27-28	**CQ WW DX C.W. Contest**

* Covered last month.
** Covered in June issue.

*14 Sherwood Rd., Stamford, Conn. 06905

eral portions of c.w. and phone bands. Also Novice bands. V.H.F. limited to 2 and 6 meter simplex only.

Appropriate awards will be awarded to all winners. Mailing deadline for logs October 1st to: Robert H. van Outer, WB4YQY, 285 Hillboro Ave., Lexington, Ky. 40505

Pennsylvania QSO Party

Two Periods: September 11 and 12.
1600 Saturday to 0500 Sunday
1300 to 2400 Sunday. (All GMT)

This is the 19th annual party sponsored by the Nittany A.R.C. The same station may be worked on each band and mode for QSO points. Penn. stations may make in-state contacts for QSO and multiplier credit.

Exchange: QSO no., RS(T) and QTH. County for Penn., ARRL section for others.

Scoring: *For Penn.*—3 points for out-of-state contacts, 1 point for in-state. Multiply total by ARRL sections worked. (inc. E Pa. and W Pa.) Also a multiplier of 1 may be taken for DX contacts, but 1 only regardless of number of DX contacts.

For others—1 point for each Penn. QSO multiplied by number of Penn. counties worked. (max. of 67)

Frequencies: C.W. — 1810, 3550, 7050, 14050, 21050, 28050. Phone—1815, 3980, 7280, 14315, 21380, 28560. Novice—3715, 7160, 21115, 28115.

Awards: Certificates to section winners with 10 or more QSOs.

Include a summary sheet with your entry showing the scoring, equipment description and other interesting information.

Mailing deadline October 15th to: Douglas Maddox, W3HDH, 1187 S. Garner St., State College, PA 16801

Washington State QSO Party

Starts: 1600 GMT Saturday,
September 11
Ends: 2400 GMT Sunday,
September 12

This is the 11th annual QSO party sponsored by the Boeing Employees A.R.S. (BEARS) The same station may be worked on each band and mode for QSO points and again if it is a new multiplier. Wash. stations may work in-state stations for QSO points.

Exchange: QSO no., RS(T) and QTH. County for Wash., state, province or country for others.

Scoring: For Wash. — One point per QSO, multiplied by the number of states, VE provinces and DX countries worked.

For Others—Two points per each Wash. QSO multiplied by number of Wash. counties worked. (max. of 39) There is an extra multiplier of 1 for each group of 8 contacts with the same Wash. county.

Frequencies: C.W. — 1805, 3560, 7060, 14060, 21060, 28160. Phone — 1815, 3935, 7260, 14310, 21380, 28660, Novice — 3735, 7125, 21150, 28160.

Awards: Certificates to the top scorers, both single and multi-operator, in each state, VE province and DX country, and each Wash. county. Additional awards where warranted. The Worked Five Bears Award is available to any one working 5 club members before, during or after the party. The Worked Three Bear Cubs is available for working 3 Novice members.

1975 Contest Results
YO DX Contest

All Band

K4PQL	32,400
VO1KE	25,404

14 MHz

WA2EAH	11,968
WB8EUN	9,240
W9QWM	858

And a list of over 150 W/K and VE/VO stations who did not submit a log.

C.W.

W1OPJ	216
WB2CKS	2,590
W2KHT	301
WA2ZWH	196
W2ESX	172
WA2EJZ	57
WB2FVT	28
WA3DMH	136
WB4WHE/4	4
K5ETA	204
W6DGH	464
W6TZD	288
W6DQX	136
WB6PZW	76
WB8BTU	242
WA8EDC	226
W9LKI	434
K9DAF	188
WB9NXT	96
W9GSB	21
WØIUB	402
WAØKDI	296

S. A. C.

VE3GCO	320
VE7CXE	280
VE3EJK	180
CY6AVO	68
VE7FE	4

Phone

W1ORP	1
W2JGR	160
WA2ZWH	115
WA3DMH	56
W4WSF	290
W6DGH	84
W6DQX	48
K3MNT/7	366
K8PYD	80
W9DDL	360
W9YRA	325
W9NKH	259
WB9EBO	120
W9LKI	100
WØWUU	21
XJ3GCO	150
VE3EJK	8

SARTG RTTY

W3EKT	114,725
K4GMH	74,240
W4CQI	73,060
K6WZ	37,350
WAØYDJ/4	36,960
W9OEQ	33,480
W1GKJ	25,885
W3KV	20,740
WA3CFK/2	17,500
W8CQ	12,825
W8TCO	1,875
VE2QD	6,270
KZ5OD	4,130

Include a check sheet for entries with 100 or more contacts. Mailing deadline is Oct. 11th to: Boeing Employees A.R.S., Att: Willis D. Propst, K7RSB, 18415 38th Ave. S., Seattle, WA 98188. (Results will be mailed to all entries, no s.a.s.e. required.)

YLRL "Howdy Days"

Starts: 1800 GMT Thursday,
September 16
Ends: 1800 GMT Saturday,
September 18

This activity is for YL's and scores will be based on contacts between YL's only. All bands and modes may be used, but cross-band and Net contacts do not count.

Score 2 points for each YLRL member worked and 1 point if its with a non-member. Only one contact with the same station is permitted regardless of the band. There is no multiplier, just add the QSO points.

The top scoring YLRL member will receive her choice of a YLRL pin, a charm or stationery. The highest scoring non-member receives a one year membership in the YLRL.

Logs must be received before October 18th and go to: Beth Newlin, WA7FFG, 826 W. Prince Road—06, Tucson, AZ 85705.

VE/W Contest

C.W.—0001 to 2400 GMT
Sat. Sept. 18

Phone—0001 to 2400 GMT
Sun. Sept. 19

The VE/VO's will be working the W/K's in the "General" portions of the US bands in this one.

Like last year the contest will be divided into two classes, c.w. and phone, with separate operating times for each. Therefore separate logs are required for each.

Only 18 hours total operating time may be used in the 24 hour period of each contest. The minimum off period is 15 mins. which must be indicated on the log.

The same station may be worked on each band for QSO and multiplier credit. There are two types of entries, single and multi-operator.

Exchange: RS(T) plus a progressive QSO no. starting with 100 for c.w. and 200 for phone, and ARRL section for W/K, and geographical areas for VE/VO. (9 provinces, Nfld., Lab., Yukon, N.W.T.)

Scoring: Two points per QSO. VE/VO use US ARRL sections worked on each band for their multiplier. W/K use VE areas. (max of 13 on each band) In addition a multiplier of 10 has been instituted for W/K's to equalize the W/VE scores. (QSOs × area multiplier × 10 = Final Score)

Awards: Certificates to the top scorers in each class in each section if there are at least 3 entries from that section. (min. of 25 QSOs) The Montreal ARC is donating Plaques to the top scoring entry, c.w. and phone, in the US and Canada.

Summary and check sheets are a must as is a declaration that rules and regulations have been observed, and a dupe check sheet for over 200 contacts. (Send s.a.e. and IRC for forms to address below)

Mailing deadline October 31st to: VE/W Contest Committee, P.O. Box 2206, Dorval Station 780, Quebec, Canada.

(Continued on page 90)

GEORGE JACOBS, W3ASK, ON

Propagation

The present sunspot cycle has become famous for its plateaus, long periods of time when it has remained relatively constant. It seems that the cycle may now be in another plateau period. The monthly mean sunspot number for April, 1976, according to the Zurich Observatory, was 19.5. Daily activity varied from a low of zero on April 7 and 8, to a high of 39 on April 21. This results in a 12-month smoothed sunspot number, upon which the cycle is based, of 16, centered on October, 1975. Between June and October, 1975, sunspot activity has remained just about constant. The smoothed sunspot number for June was 16, July 15, August 14, September 15 and October 16.

At first glance, one might think that the minimum of the present cycle may have occurred during August, 1975, and that the new cycle has already started and is on its way up. This isn't the case, since detailed examination of the positions of the spots on the sun's surface and their magnetic fields shows that most of the present sunspots are still from the *old* cycle, and that a new cycle has not yet started.

The present plateau will probably continue for another month or two, and then the cycle will begin to decline again towards a minimum value. This means that solar activity will be a bit higher this summer than originally thought, and that the minimum of the present cycle may not occur until very late this year, or during 1977.

A smoothed sunspot number of approximately 10 is expected for August, 1976,

During August *20* meters should continue to be the best band for DX propagation. Openings are forecast to most areas of the world between sunrise and midnight when conditions are at least LOW NORMAL. Peak conditions should occur for a few hours after local sunrise, and again during the late afternoon and early evening. Excellent short-skip openings are also expected on *20* from shortly after sunrise to almost midnight. These should range from a few hundred miles out to the one-hop limit of 2300 miles.

Not much DX expected on *10* meters, but an occasional openings towards South America should be possible during the afternoon, when conditions are HIGH NORMAL, or better. Look for frequent short-skip openings on *10* between distances of about 500 and 1300 miles.

There's a good chance for *15* meter DX openings towards South America and other southern areas during the afternoon hours, especially when conditions are HIGH NORMAL, or better. Frequent short-skip openings are also expected throughout the daylight hours between distances of about 400 and 1300 miles.

Some fairly good *40* meter DX openings are forecast to many areas of the world from sunset through the sunrise period. Look for excellent short-skip openings between approximately 250 and 750 miles during most of the daylight hours, and between about 750 and 2300 miles at night.

Despite seasonally high static levels, some fairly good DX openings should be possible on *80* meters during the hours of darkness. Expect conditions to peak just as the sun begins to rise on the "light" side of the transmission path. Try *80* meters for short-skip openings up to about 250 miles during the daylight hours, and between 250 and 2300 miles during the hours of darkness.

It's still too early for *160* meter DX openings on a regular basis, but look for the occasional one during the hours of darkness and the sunrise period. Short-skip on *160* meters looks good for the hours of darkness, up to distances of approximately 1300 miles, and possibly beyond.

Since the summer propagation season should end by mid-September, this month's *DX Propagation* Charts cover only a *one month* period rather than the usual two month span. *Short-Skip* Charts for August appeared in last month's column.

LAST MINUTE FORECAST—AUG.

Day-to-Day Conditions Expected For Aug. 1976

	Expected Signal Quality			
Propagation Index	(4)	(3)	(2)	(1)
Date				
Above Normal: 22	A	A	B	C
High Normal: 2-3, 6-7, 21, 26, 30	B	B	C	D
Low Normal: 1, 8-9, 12-14, 15-17, 20, 23-25, 29	B	C	D	E
Below Normal: 4-5, 10-11, 18-19, 27-28, 31	C	D	E	E
Disturbed: None	D	E	E	E

Where *expected signal quality is:*

A—Excellent opening, exceptionally strong, steady signals greater than S9+30 dB.

B—Good opening, moderately strong signals varying between S9 and S9+30 dB, with little fading or noise.

C—Fair opening, signals between moderately strong and weak, varying between S3 and S9, with some fading and noise.

D—Poor opening, with weak signals varying between S1 and S3, and with considerable fading and noise.

E—No opening expected.

HOW TO USE THIS FORECAST

1. Find *propagation index* associated with particular band opening from Propagation Charts appearing on the following pages.
2. With the *propagation index*, use the above table to find the expected signal quality associated with the band opening for any day of the month. For example, a path shown in the Charts with propagation index of (3) will open fair (C) on Aug. 1, improve to good (B) on the 2nd and 3rd, drop to poor (D) on Aug. 4 and 5, etc.

For updated information dial Area Code 516-883-6223 for DIAL-A-PROP, subscribe to bi-weekly MAIL-A-PROP, P.O. Box 86, Northport, NY 11768, or check WWV at 14 minutes past each hour.

V.H.F. Ionospheric Openings

Frequent sporadic-E propagation is expected to continue during August, with a good possibility for *6* meter openings between distances of approximately 750 and 1300 miles. During periods of intense and widespread sporadic-E ionization, *6* meter two-hop openings may be possible up to about 2500 miles. During periods of intense ionization also check

*11307 Clara St., Silver Spring, MD 20902.

HOW TO USE THE DX PROPAGATION CHARTS

1. Use Chart appropriate to your transmitter location. The Eastern USA Chart can be used in the 1, 2, 3, 4, 8, KP4, KG4 and KV4 areas in the USA and adjacent call areas in Canada; the Central USA Chart in the 5, 9 and 0 areas; the Western USA Chart in the 6 and 7 areas, and with somewhat less accuracy in the KH6 and KL7 areas.

2. The predicted times of openings are found under the appropriate meter band column (15 through 80 Meters) for a particular DX region, as shown in the left hand column of the Charts. A ** indicates the best time to listen for 10 meter openings; * best times for 160 meter openings.

3. The *propagation index* is the number that appears in ( ) after the time of each predicted opening. The index indicates the number of *days* during the month on which the opening is expected to take place as follows:

(4) Opening should occur on more than 22 days
(3) Opening should occur between 14 and 22 days
(2) Opening should occur between 7 and 13 days
(1) Opening should occur on less than 7 days

Refer to the "Last Minute Forecast" at the beginning of this Propagation column for the actual *dates* on which an opening with a specific propagation index is likely to occur, and the signal quality that can be expected.

4. Time shown in the Charts are in the 24-hour system, where 00 is midnight; 12 is noon; 01 is 1 A.M., 13 is 1 p.m., etc. Appropriate *daylight* time is used, *not GMT*. To convert to GMT, add to the times shown in the appropriate chart 7 hours in PDT Zone, 6 hours in MDT Zone, 5 hours in CDT Zone, and 4 hours in EDT Zone. For example, 14 hours in Washington, D.C. is 18 GMT. When it is 20 hours in Los Angeles, it is 03 GMT, etc.

5. The charts are based upon a transmitter power of 250 watts c.w., or 1 kw, p.e.p. on sideband, into a dipole antenna a quarter-wavelength above ground on 160 and 80 meters, a half-wave above ground on 40 and 20 meters, and a wavelength above ground on 15 and 10 meters. For each 10 db gain above these reference levels, the *propagation index* will increase by one level: for each 10 db loss, it will lower by one level.

6. Propagation data, contained in the Charts has been prepared from basic data published by the Institute For Telecommunication Sciences of the U.S. Dept. of Commerce, Boulder, Colorado, 80302.

for possible short-skip openings on 2 meters, over a range of about 1100 to 1300 miles.

One of the year's most prolonged and intensive meteor showers, the *Perseids*, should take place between August 10 and 14. Maximum intensity is expected during the late evening hours of the 12th, with an average count of 50 meteors an hour. Ionization produced as these meteors enter the earth's atmosphere should make possible numerous meteor-scatter type openings on the 6 and 2 meter bands. The range of these openings could be up to several hundred miles, and beyond.

There is a possibility for some auroral-scatter propagation on the vhf bands during August, when the ionosphere is disturbed. Check the "Last Minute Forecast" appearing at the beginning of this column for those days that are expected to be BELOW NORMAL or DISTURBED on the h.f. bands. These or the days when vhf auroral-type openings are most likely to occur.

Auroral-scatter type openings can range from a few hundred up to about a thousand miles, and are usually characterized by very rapid flutter fading, and Doppler shift on s.s.b. signals.

73, George, W3ASK

August 15-September 15, 1976
Time Zone: EDT (24-Hour Time)
EASTERN USA TO:

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Western & Central Europe & North Africa	10-12 (1) 14-17 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	18-19 (1) 19-20 (2) 20-00 (3) 00-02 (2) 02-04 (1)	20-21 (1) 21-22 (2) 22-00 (3) 00-02 (2) 02-03 (1) 21-22 (1)* 22-00 (2)* 00-02 (1)*
Northern Europe & European USSR	10-12 (1) 14-16 (1)	07-08 (1) 08-10 (2) 10-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	19-21 (1) 21-23 (2) 23-01 (3) 01-02 (2) 02-03 (1)	21-23 (1) 23-01 (2) 01-02 (1) 23-01 (1)*
Eastern Mediterranean & Middle East	13-16 (1)	07-08 (1) 08-09 (2) 09-14 (1) 14-16 (2) 16-17 (1) 22-00 (1)	19-21 (1) 21-23 (2) 23-00 (1)	22-00 (1)
Western Africa	10-14 (1) 14-16 (2) 16-17 (1)	13-15 (1) 15-16 (2) 16-17 (3) 17-18 (4) 18-19 (3) 19-20 (2) 20-21 (1)	20-23 (1) 23-02 (2) 02-04 (1)	22-23 (1) 23-01 (2) 01-02 (1) 22-01 (1)*
Eastern & Central Africa	14-16 (1)	15-17 (1) 17-19 (2) 19-20 (1)	20-22 (1) 22-00 (2) 00-01 (1)	22-00 (1)
Southern Africa	10-12 (1) 12-14 (2) 14-15 (1)	07-15 (1) 15-17 (2) 17-19 (1) 23-01 (1)	21-22 (1) 22-01 (2) 01-02 (1)	22-01 (1) 22-00 (1)*
Central & South Asia	*Nil*	08-11 (1) 20-23 (1)	06-08 (1) 18-21 (1)	07-08 (1) 18-21 (1)
South-east Asia	*Nil*	08-11 (1) 19-22 (1)	06-08 (1)	06-08 (1)
Far East	*Nil*	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-21 (2) 21-22 (1)	06-08 (1) 18-19 (1)	06-08 (1)
South Pacific & New Zealand	13-16 (1) 16-18 (2) 18-20 (1)	07-08 (1) 08-11 (2) 11-13 (1) 18-21 (1) 21-00 (2) 00-07 (1)	01-02 (1) 02-03 (2) 03-06 (3) 06-08 (2) 08-09 (1)	03-04 (1) 04-07 (2) 07-08 (1) 04-07 (1)*
Australasia	16-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-16 (1) 16-18 (2) 18-21 (1) 21-23 (2) 23-01 (1)	03-04 (1) 04-07 (2) 07-08 (1)	04-05 (1) 05-06 (2) 06-07 (1) 05-06 (1)*
Caribbean, Central America & Northern Countries of South America	12-14 (1)1** 14-16 (2)** 16-17 (1)** 09-11 (1) 11-15 (2) 15-17 (3) 17-19 (2) 19-20 (1)	06-07 (1) 07-08 (2) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-00 (1)	19-20 (1) 20-21 (2) 21-04 (3) 04-06 (2) 06-08 (1)	22-02 (1) 02-04 (2) 04-07 (1) 02-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	14-17 (1)** 09-10 (1) 10-12 (2) 12-15 (1) 15-16 (2) 16-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-11 (2) 11-16 (1) 16-17 (2) 17-19 (4) 19-21 (2) 21-23 (1) 23-00 (2) 00-02 (1)	21-22 (1) 22-23 (2) 23-01 (3) 01-03 (2) 03-05 (3) 05-06 (2) 06-07 (1)	22-02 (1) 02-04 (2) 04-06 (1) 02-05 (1)*
McMurdo Sound Antarctica	*Nil*	07-09 (1) 21-22 (1) 22-00 (2) 00-01 (1)	01-03 (1) 03-06 (2) 06-07 (1)	03-06 (1)

Time Zones: CDT & MDT
(24-Hour Time)
CENTRAL USA TO:

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Western & Central Europe & North Africa	13-15 (1)	06-07 (1) 07-09 (2) 09-13 (1) 13-14 (2) 14-16 (3) 16-17 (2) 17-18 (1)	20-22 (1) 22-01 (2) 01-04 (1)	22-02 (1)

*Indicates best times for 160 Meter openings.
**Indicates best times for 10 Meter openings.

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Northern Europe & European USSR	13-15 (1)	06-07 (1) 07-09 (2) 09-12 (1) 12-15 (2) 15-17 (1) 21-23 (1)	20-22 (1) 22-00 (2) 00-02 (1)	22-01 (1)
Eastern Mediterranean & Middle East	12-14 (1)	07-12 (1) 12-15 (2) 15-18 (1) 21-23 (1)	20-23 (1)	21-22 (1)
Western Africa	10-12 (1) 12-14 (2) 14-15 (1)	07-09 (1) 13-15 (1) 15-16 (2) 16-18 (3) 18-19 (2) 19-21 (1)	20-22 (1) 22-01 (2) 01-02 (1)	22-23 (1) 23-00 (2) 00-01 (1)
Eastern & Central Africa	13-15 (1)	07-09 (1) 15-17 (1) 17-18 (2) 18-20 (1)	21-00 (1)	*Nil*
Southern Africa	10-11 (1) 11-13 (2) 13-14 (1)	07-09 (1) 12-15 (1) 15-17 (2) 17-18 (1) 22-01 (1)	20-21 (1) 21-23 (2) 23-01 (1)	22-00 (1)
Central & South Asia	*Nil*	07-08 (1) 08-10 (2) 10-11 (1) 18-21 (1)	06-08 (1) 19-21 (1)	07-08 (1) 20-21 (1)
South-east Asia	17-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 20-23 (1)	06-08 (1)	06-08 (1)
Far East	16-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-22 (2) 22-00 (1)	03-06 (1) 06-07 (2) 07-08 (1)	05-07 (1)
South Pacific & New Zealand	16-18 (1)** 12-14 (1) 14-19 (2) 19-20 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-18 (1) 18-21 (2) 21-23 (3) 23-01 (2) 01-04 (1)	00-01 (1) 01-03 (2) 03-06 (3) 06-08 (2) 08-09 (1)	02-04 (1) 04-06 (2) 06-07 (1) 04-06 (1)*
Australasia	16-19 (1)	06-07 (1) 07-08 (2) 08-09 (3) 09-10 (2) 10-11 (1) 18-20 (1) 20-00 (2) 00-02 (1)	02-04 (1) 04-07 (2) 07-09 (1)	04-05 (1) 05-07 (2) 07-08 (1) 05-07 (1)*
Caribbean, Central America & Northern Countries of South America	11-14 (1)** 14-16 (2)** 16-17 (1)** 08-10 (1) 10-14 (2) 14-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-08 (3) 08-10 (4) 10-12 (3) 12-15 (2) 15-17 (3) 17-19 (4) 19-21 (3) 21-22 (2) 22-01 (1)	19-21 (1) 21-23 (2) 23-03 (3) 03-06 (2) 06-07 (1)	21-00 (1) 00-03 (2) 03-06 (1) 00-05 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	14-17 (1)** 08-09 (1) 09-11 (2) 11-15 (1) 15-16 (2) 16-17 (3) 17-18 (2) 18-19 (1)	07-08 (1) 08-11 (2) 11-15 (1) 15-17 (2) 17-19 (4) 19-21 (2) 21-23 (1) 23-00 (2) 00-02 (1)	21-22 (1) 22-23 (2) 23-01 (3) 01-03 (2) 03-05 (3) 05-06 (2) 06-07 (1)	22-01 (1) 01-04 (2) 04-06 (1) 02-05 (1)*
McMurdo Sound, Antarctica	15-18 (1)	08-10 (1) 20-21 (1) 21-23 (2) 23-00 (1)	01-03 (1) 03-06 (2) 06-07 (1)	03-06 (1)

Time Zone: PDT (24-Hour Time)
WESTERN USA TO:

	15 Meters	*20 Meters*	*40 Meters*	*80 Meters*
Western & Southern Europe & North Africa	*Nil*	06-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-16 (1) 22-00 (1)	20-21 (1) 21-23 (2) 23-00 (1)	22-23 (1)
Central & Northern Europe & Northern USSR	*Nil*	06-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-15 (1) 21-23 (1)	19-20 (1) 20-22 (2) 22-23 (1)	21-23 (1)
Eastern Mediterranean & Middle East	*Nil*	07-08 (1) 08-10 (2) 10-12 (1) 12-13 (2) 13-14 (1) 20-22 (1)	20-23 (1) 06-08 (1)	21-22 (1)

(Continued on page 90)

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AFS' INTRODUCES THE FIRST ACOUSTICALLY DESIGNED OUTDOOR REMOTE P.A. SPEAKER AND THAT'S NO BULLHORN!

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There is no substitute.

3854 3750 3855

hy-gain®
Amateur Radio Systems.

There is no substitute for quality, nor performance, nor the satisfaction of owning equipment that is the very best.

Hence, the incomparable Hy-Gain 3750 Amateur Transceiver. It is unquestionably the finest unit available today.

The 3750 covers all amateur bands from 1.8 through 30 MHz (160-10 meters). It utilizes advanced Phase-Lock-Loop circuitry, dual-gate MOS FET's at all critical RF amplifier and mixer stages, a narrow band SSB crystal filter and a 50 kHz T-notch filter. And that's just the beginning.

The 3750 also incorporates audio and microphone compression circuits, ALC, specially developed S-2002 tubes, and a VFO section that's so stable drift is less than 100 Hz (after a 30 minute warm-up.)

There's a rotating dial for low-speed frequency indication and easy band-scanning. And an electronic frequency counter with four-place digital readout to 100 Hz for pinpoint accuracy. The tuning section also includes a memory circuit for remembering frequencies with a flip of a switch. A 10 MHz WWV receive position eliminates the need for a crystal calibrator.

A speaker unit (3854) with tailored audio response frequency and a complete external VFO(3855) with provision for 7 crystal controlled channels are available in matching cabinets.

See your amateur radio dealer for complete details on the Hy-Gain 3750, or write our Department MM. There is no substitute.

SPECIFICATIONS

Frequency coverage

1.8 MHz Band	1.8 - 2.0 MHz
3.5 MHz Band	3.5 - 4.0 MHz
7.0 MHz Band	7.0 - 7.5 MHz
14 MHz Band	14.0 - 14.5 MHz
21 MHz Band	21.0 - 21.5 MHz
28 MHz Band A	28.0 - 28.5 MHz
28 MHz Band B	28.5 - 29.0 MHz
28 MHz Band C	29.0 - 29.5 MHz
28 MHz Band D	29.5 - 30.0 MHz
WWV	RX only 10.0 MHz

MIC, input impedance
50KΩ
Frequency
300 - 2700Hz (−6dB)
Sensitivity
SSB less than .25 μv for 10 dB S/N+N ratio
CW less than .15 μV for 10 dB S/N+N ratio

Modes of operation
SSB (LSB or USB)
CW
Input power
200W
1.8-21.5MHz
100W
28-30MHz
ANT, impedance
50Ω - 75Ω Unbalanced
Carrier suppression
More than 50dB
Side band suppression
More than 50dB
Spurious and harmonic suppression
Greater than 40dB
3rd order distortion products suppression
Greater than 30dB

IF Frequencies
1st IF 9MHz
2nd IF 50kHz
Selectivity
SSB 2.4kHz (−6dB)
4.0kHz (−66dB)
CW 400Hz (−6dB)
1.8kHz (−66dB)
Audio output into 8Ω load
2.5W (10% distortion)
3.0W (MAX)
Power source
AC 120V 50/60 Hz (can be re-wired for 240V)

Power drain
400VA TX
78VA RX
48VA RX (Power tube OFF)
Semi-conductors

Transistor	98
IC	43
Diode	120
Tube	3
Digital Ind.	1

Weight
44 lbs. 6 ozs. (23kg)
Dimensions
16-3/4" x 7" x 13-5/8" (420 x 172 x 340mm)

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Amateur Radio Systems.

Hy-Gain Electronics Corporation
8601 Northeast Highway Six; Lincoln, NE 68505

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UNITED STATES OF AMERICA

COUNTY AWARD

BY

CQ

THE RADIO AMATEUR'S JOURNAL

Be it known to all those present, that on this day _____

has provided satisfactory evidence in communicating with five-hundred or more different counties of the United States of America, with special Band/Mode endorsements affixed hereto.

Endorsements

_____ _____

_____ _____

_____ _____

_____ _____

Certificate no. _____

Date _____

_____

USA-CA Custodian

2500 COUNTIES | 2000 COUNTIES | 1000 COUNTIES | 1500 COUNTIES | 3000 COUNTIES

USA-CA RULES AND PROGRAM

The United States of America Counties Award sponsored by **CQ**, is issued for confirmed contacts with specified numbers of U.S. counties under Rules and conditions hereafter stated.

A. Awards Classes:

The USA-CA is issued seven (7) different classes, each a separate achievement as endorsed on the basic certificate by use of special seals for higher class. Also, special endorsements will be made for all one band or mode operations subject to the rules.

Class	Counties Required	States Required
USA-500	500	any
USA-1000	1000	25
USA-1500	1500	45
USA-2000	2000	50
USA-2500	2500	50
USA-3000	3000	50

USA 3075-CA for ALL counties and Special Honors Plaque ($15.00)

B. Conditions:

1– USA-CA is available to all licensed amateurs everywhere in the world and is issued to them as individuals for all county contacts made, regardless of calls held operating QTHs or dates whatever.

Special USA-CA's also available to s.w.l.'s on a heard basis.

2– All contacts must be confirmed by QSL and such QSLs must be in one's possession for identification by certification officials.

3– Any QSL card found to be altered in any way disqualifies applicant.

C. County Identity:

1– The Directory of Post Offices (P.O.D. Publication No. 26) will be the official guide in determining identity or counties of contact as ascertained by name or nearest municipality. It is suggested a copy of P.O.D. Publication No. 26 be obtained to facilitate operating reference and pre-check cards for application purpose. Publication No. 26 is available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Price $5.05)

2– Unless otherwise indicated on QSL cards, the QTH printed on cards will determine county identity. If mobile not near a city, county identity OK.

3– In the case of Cities, Parks or Reservations not within counties proper, applicants may claim any one of adjoining counties for credit (Once).

D. Administration of USA-CA Program:

1– The USA-CA program will be administered by a **CQ** staff member acting as USA-CA Custodian, and all applications and related correspondence should be sent direct to him at his QTH.

2– Decisions of the Custodian in administering these Rules and their interpretation including future amendments are final.

E. Record Book and Bookkeeping:

1– The scope of USA-CA makes it mandatory that special Record Books be used for application. For this purpose, **CQ** has provided a 64 page 4¼" by 11" Record Book which contains application and certification forms and which provides record-log space meeting the conditions of any Class award and/or endorsement requested.

2– A completed USA-CA Record Book constitutes medium of basic application and becomes the property of **CQ** for record purposes. On subsequent applications for either higher classes or for special endorsements, applicant may use additional Record Books to list required data or may make up own alphabetical lists conforming to requirements.

3– Record Books are to be obtained directly from **CQ**, 14 Vanderventer Ave., Port Washington, L.I., N.Y. 11050 for $1.00 each. Recommend two be ontained, one for application use and one for personal file copy.

F. Application:

1– Make Record Book entries necessary for county identity and enter other log data necessary to satisfy any special endorsements (band-mode) requested.

2– Have the certification form provided signed by two licensed amateurs (General Class or higher) or an official of a national-level radio organization or affiliated club, verifying that QSL cards for all contacts as listed have been seen. The USA-CA Custodian reserves the right to request any specific cards to satisfy any doubt whatever. In such cases applicant should send sufficient postage for return of cards by registered mail.

3– Send original completed Record Book and certification forms and handling fee of $1.00 U.S. or 10 IRC's to USA-CA Custodian, Ed Hopper, W2GT, Box 73, Rochelle Park, NJ 07662. For later applications for highter class seals, send either Record Book or self prepared list per the rules and 25c or 3 IRC's handling charge. For application for later special endorsements (Band/Mode) where certificates must be returned for endorsement, send certificate and 50c or 5 IRC's for handling charges. Note: At the time any USA-CA award cerfificate is being processed there are no charges other than the basic fee regardless of number of endorsements or seals; likewise, one may skip lower classes of USA-CA and get higher classes without losing any lower awards credits or paying any fee for them. ■

A. EDWARD HOPPER, W2GT, ON

Awards

Special Honor Roll (All Counties)

#146—Raleigh Poisson, W7PXA 422-76
#147—Walter G. Burdine, W8ZCV 4-29-76

USA-CA Honor Roll

3000	2000	1000
W7PXA ..168	W7PXA ..249	W7PXA ..395
W8ZCV ..169	W7GHT ..250	W7GHT ..396
2500	W8ZCV ..251	W8ZCV ..397
W7PXA ..209	**1500**	**500**
W7GHT ..210	W7PXA ..296	W7PXA .1103
WA7VGA 211	W7GHT .297	W7GHT .1104
W8ZCV ..212	W8ZCV ..298	WA6OKQ 1105

The "Story of The Month" for August as told by Ken is:

Ken Albrecht, K6BWD
All Counties #122, 3-3-75

Ken was born 54 years ago (and aging daily, like all of us) in New York City, raised in Hartford, Conn., and received his BA from Trinity College in Hartford, in 1942, then to Harvard Business School 1942-1943. Enlisted in the Army and was called to active duty April 1943 and got out February 1946. First visit to FCC 1932 got B license which lapsed and was not renewed. Obtained license again in 1949 as W5PXW in Louisiana and has been active ever since.

In 1968 he remarried. His new wife's name is Madeline. Ken has 3 grown daughters and 4 grandchildren. Madeline has 2 grown sons and 2 grandchildren, so the combined count is 5 children and 6 grandchildren.

Ken spent 20 years in the escrow business in California and Las Vegas, mostly in the Los Angeles area. Went into the Motel business in February 1972, has this one (Crown Lodge) up for sale and he is looking for a larger one perhaps in the Texas area.

Ken is a Mason and a Rotarian. He is also very proud of his amateur honors, like A-1 Operator (he also does a fine job as Net Control, Ed.), OBS, RCC, WAS, ISSB #6842, 10-X #4832, MARAC #519, All Counties #122. Has about 175 confirmed but never applied for DXCC. Even has over 135 Countries confirmed with his W7EJU call.

*P.O. Box 73, Rochell Park, N.J. 07662.

Ken Albrecht, K6BWD, W7EJU, EX: W5PXW.

Crown DD Lodge a Friendship Inn formerly owned by Ken, K6BWD.

He was very active in traffic nets in the 50s and was chief NCS of the American Legion Net on 3975 for 2 years (This NET now defunk). He was 1st President of ARK-LA-TEX Amateur Radio Club of Shreveport, Louisiana. And when this was written he needed but 2 QSLs for 5 band WAS.

Obviously, Ken has enjoyed most facets of amateur radio, he initiated the first transcontinental MARS Net (ARMY) when living in Louisiana and has held PAM and OPS appointments and was a WESTCARS member a few years back. Also was an active phone patcher in the 50s to GIs in the Pacific area.

In the mid 60s Ken operated mobile from California to Florida and back and first became acquainted with County Hunting from the mobile side, although not a Hunter himself until September 1972.

He won a number of SS Sectional Awards in the past years and still enjoys contests, up to a point, and usually enters CD Parties and SS and on occasion piddles with DX Contests.

Ken is an avid coin collector and formerly was hot and heavy into stamp collecting.

Ken wants to thank *ALL* County Hunters, and mobilers in particular for without their help no *All Counties Awards* could be issued.

NOTE: Since this was written, Ken has acquired the "ROADWAY INN" at 105 S 77th Bypass, Kingsville, Texas 78363 from where you can hear that big signal signing K6BWD/5.

Awards Issued

Raleigh Poisson, W7PXA waited until he had them *all* and then won USA-CA-500 through USA-CA-2000 endorsed All SSB and USA-CA-2500 through them *all* endorsed All Phone.

Walt Burdine, W8ZCV (formerly *CQ* Novice Editor) was issued USA-CA-

Senior Centennial Colorado Ten-Ten Award, (Engraved on a PC board), data page 62 CQ March '76.

1000 through USA-CA-2500 endorsed All SSB, All Mobiles and USA-CA-3000 and *All Counties* endorsed All Phone.

Bill Smith, W7GHT obtained USA-CA-500 and 1000 endorsed All SSB, All Mobiles, All A-1 and USA-CA-1500 through USA-CA-2500 endorsed All SSB, All Mobiles.

Jim Lucht, WA7VGA added USA-CA-2500 to his collection.

Paul Veltman, WA6OKQ acquired USA-CA-500 endorsed All SSB.

Awards

When you read this, 1976, The Bicentennial Year will be more than half gone, so I better again give some brief data on pertinent awards.

Massachusetts Bicentennial Award: Rules *CQ* May 1976 page 64 or s.a.s.e. to: William Holliday, WA1EZA, 22 Trudy Terrace, Canton, Mass. 02021.

California Bicentennial Award: Rules *CQ* December 1975, page 72 or s.a.s.e. to: Jim M. Ruys, W6UZX, NCDXC, Menlo Park, P.O. Box 608, California 94025.

National Capitol DX Ass'n USA Bicentennial Award: Rules *CQ* December 1975, page 72 or s.a.s.e. to: Raymond E. Spence, W4QAW, 10013 Coach Road, Vienna, Virginia 22180.

USA-WPX-76 Award: Rules *CQ* October 1975, page 27 or *CQ* April 1976, page 42 or s.a.s.e. to: Bernie Welch, W8IMZ, 7735 Redbank Lane, Dayton, Ohio 45424.

Virginia Independence Bicentennial Award: Rules *CQ* May 1976, page 64 or s.a.s.e. to The Richmond Amateur Radio Club, P.O. Box 73, Richmond, Virginia 23201.

San Jose Bicentennial Award: Rules *CQ* May 1976, page 64 or s.a.s.e. to: The Club Secretary, SCCARA, P.O. Box 6, San Jose, California 95103.

New Jersey Bicentennial Award 1976: Rules *CQ* June 1976 my column or s.a.s.e. to: Gene Bond, WB2UVR, 15 East Camden Avenue, Moorestown, N.J. 08057.

Three (3) Bicentennial Awards (by WB9GLQ): Rules *CQ* July 1976 my column or s.a.s.e. to Bicentennial Awards, P.O. Box 981, Oakbrook, Illinois 60521.

1976 Olympic Awards (2): Rules *CQ* November 1975 pages 73 and 75 or s.a.s.e. to: VE3LSS, Radio Club, Listowel District Secondary School, Mr. G. Hammond, 155 Maitland Avenue, S., Listowel, Ontario, Canada N4W 2M4.

1976 Summer Olympics Award: Rules *CQ* January 1976 page 66 or s.a.s.e. to: Secretary, Westminster Amateur Radio School, Box 323, Montreal Int'l Airport, A. M. F., P.Q., Canada.

Fifty-Grand On Ten Award: Sponsored by the Colorado Ten-Ten Chapter, who issue 6 Awards for required contacts on 10 meters—see page 62 of March 1976 *CQ* for data on some of them, or s.a.s.e. to WB0FQD. This Fifty-Grand Award requires list of 50 10-× awards earned and 75¢ to: Rich Richardson, WB0FQD, 960 E. Cottonwood Avenue, Littleton, Colorado 80121. Centennial Net Information: Tuesdays, Thursdays and Saturdays 1800 hrs. MST on 28.625 and Tuesdays at 2000 hrs. MST on 28.625.

The 100 Years Bayreuth Festival Diploma (BFD): The Ortsverband Bayreuth of DARC issues this Diploma on the occasion of 100 years Bayreuth Festival of Richard Wagner. Available to all licensed amateurs and s.w.l.s. for contacts with (or reception of) the German DOK B06 and Z42. Only contacts between January 1, 1976, and December 31, 1977, are/will be valid. Each QSO with German DOK B06 and Z42 will be counted. Compensation QSOs: One QSO with Leipzig and one QSO with Munich can be counted—these were important places in the life of Richard Wagner.

UKW stations need 5 contacts with different stations.

EU stations need 10 contacts with different stations.

DX stations need 3 contacts with different stations.

There are no band nor mode limitations. The cost is: DM 5.00, or US-dollar $2.00, or 10 IRCs.

GCR list to Manager, Paul Maisel, DL1ES, D 8580 Bayreuth, Habichtweg 15, Germany.

List of stations valid for the award: DB1NQ; DB3NU; DB3NW; DB4NO; DB5NF, NZ; DB6NU, NV, NY; DB9NA, NN, NU; DC4WB, WC, WD, WE, WF, WG, WH, WI, WK, WM, WQ, WS, WV, WW; DC5NN, NR, NV; DC6LZ, YL; DC8NE, NG, PG; DC9NL, RW; DJIND; DJ2MJ, NC, VL; DJ3NP; DJ4KG; DJ5KI; DJ6NL, MB; DJ8KC, ZY; DJ9AS, JQ; DK2EB, TR, UA, UB, UC, YL; DK3CZ, DO; DK5HC, NF, NG, NI, NJ, NM; DK6NM; DK7NF, NN, NU, DK0BT, BY; DL1ES; DL2AX; DL3KS, KW, LA, LE, SN; DL4ND, NK; DL6CA, CB, CC, FQ; DL9CM, ZV, ZW, DL0BY.

Notes

What a great time I had when I finally got to make my first trip to the Dayton, Ohio Ham-Fest the weekend of April 23rd. Twenty-two members of our radio club, N.J.DXA made it. I met some County Hunters (many old friends) but sorry to say that with over 12,000 hams there, I missed meeting many County Hunters, sorry!

For additional County Hunter data on frequencies, routine, special

Fifty-Grand On Ten

QSLs, QSL Bureaus, send s.a.s.e. (with 35¢ postage on it) to Bertha Eggert, WA4BMC, P.O. Box 6811, Southboro Station, West Palm Beach, Florida 33405.

Sorry, but please don't request credits for contacts with WB6CKU-/M.

May I suggest you send a card requesting the latest catalogue from TAB Books, Blue Ridge Summit, PA. 17214. Write and tell me, How was your month? 73, Ed., W2GT.

Where Are You Now?

The following people have been issued certificates for various contests, however due to incorrect addresses we have been unable to send them. If you know the whereabouts of any of these people please drop a line to CQ Magazine, 14 Vanderventer Ave., Port Washington, N.Y. 11050.

WWDX - 1967
KL7FRY, HA2MM, ZD5M
WWDX - 1968
DM4SLG 8P6CV, VU2DKZ, DM2BOG DL4FB, OM1ADP, VE2BV
WWDX - 1969
I1NU, OX5BLV, KA2RH, PAØXPQ FG7XX, CR6GO
WWDX -1971
W0NQQ, KR6AY, FYONA, VK6WO, WB2RLK/VE1
WWDX - 1972
K8WWU
WW Side Band DX - 1967
GM5ACE
WW Side Band DX - 1969
GD3AIM, HS3RT, VK6HJ, OD2ABV KR6KN, VK1GD
WW Side Band DX - 1970
DM6AO, XW8DX
WW WPX - 1972
OX5BA
160 Meter Contest - 1973
8P6DR

Surplus Sidelights

BY GORDON ELIOT WHITE

The AN/GRR-5 receiving set has been around a while, but has not been written up in any of the amateur literature, as far as I am aware. That is an unfortunate oversight, for this 1.5 — 18 MHz receiver is a pretty fair unit for amateur use, even if it is not of the quality of the R-390 equipment.

The receiver section of the AN/GRR-5 is the R-174/URR, built by the Emerson Company.

Aside from its military packaging, the R-174/URR is a straightforward superheterodyne receiver, operable on 115 volts, 60 Hz power. The accompanying power supply unit (PP-308/URR) must be used, as it contains the power transformers and filter components. The PP-308 may be switched to use 6, 12 or 24 volt d.c. power, as from a vehicle battery, or dry batteries (90 volt B+ and 1.5 volt for filaments) The switch is on the front panel of the power supply, and is self-explanatory.

The power unit also contains a speaker for the set. One note: the power unit is too efficiently sealed. When in use, an air passage to the rear of the speaker should be provided, by loosening one of the front panel caps on the power unit.

The GRR-5 set covers four bands, 1.5-2.7 MHz; 2.7-5 MHz and 5-9.5 MHz, and 9.5-18 MHz. Tuning within any band is continuous, and ten preset channels are available, using the special tuning selector, if desired.

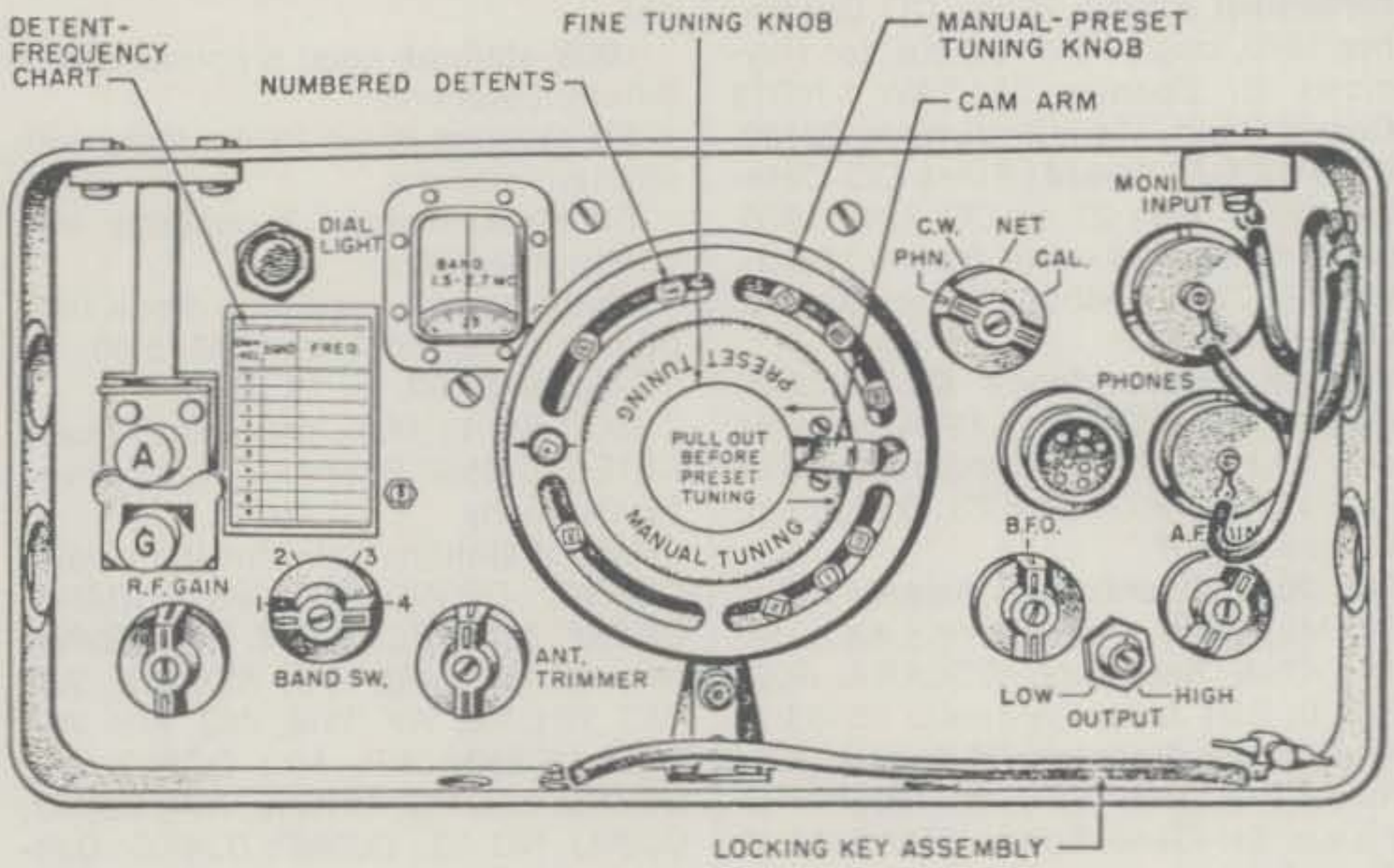
Intermediate Frequency is the common 455 kHz. A crystal calibrator is provided to give 200 kHz checkpoints. A.m. sensitivity is rated at 5 uv or better for 10 mw audio output with a signal plus noise to noise ratio of 10:1. C.w. sensitivity is rated at 2 uv. The receiver and power supply together weigh 60.5 pounds.

The GRR-5 came with several accessories, including a whip mast antenna, of the MS-116 type, headsets, mountings, tools, etc. Most of these items are usually long lost by this time, but the tools look very nice, including a handy mesh type tube puller.

Controls on the receiver include beat frequency oscillator, and the usual r.f. and a.f. gain, controls, dial light switch, and so on. The sets were used on such Army or Air Force vehicles as the M-16 quad-fifty gun carriage, the M3A1 half-track, and the M-39 armored car, among others.

The receiver itself uses eight miniature tubes, with four more in the power supply. A vibrator is provided for low-voltage inputs, and for providing filament voltage on battery power.

The pre-set tuning is adjusted in two steps: first see that all the num-



At the top is the R-174/URR receiver front panel and below is the front panel for the PP-308/URR power supply.

*1502 Stonewall Road, Alexandria VA 22303.

bered detents are within the tuning azimuth of the conrol by placing the arrowed hole over all the detents. If a detent is not in the tuning range, place one of the holes of the manual present tuning control over the detent nut, place the locking key over the nut, and loosen it. With the key on the nut, rotate the control until the detent is within the tuning azimuth, and tighten the nut.

Second: set the bandswitch and manual preset tuning controls for the desired frequency. Place the arrowed hole over the desired numbered detent by rotating the manual-preset tuning control. Loosen the numbered nut with the key and lift the cam arm.

Leaving the key in place, rotate the control back to the channel frequency, push in the fine-tuning control and adjust it. Adjust the antenna trimmer for maximum signal. Rock the fine-tuning control. Tighten the numbered nut to secure the detent, push down the cam arm, and remove the key. ■

Antennas *(from page 53)*

for my schedule with Iraq. Guess I had better leave".

"Before you go, you might be interested in this gadget which has just surfaced in the CB market", I said, handing my colleague a photograph (fig. 8). This is a stationary mount for a CB whip antenna made by *Turner division of Conrac.* You'll note that it bolts to any horizontal pipe-like structure. This is ideal for portable work when you want to clamp a whip onto a railing, fire escape rail or a metal fance. The mount has a standard SO-239 receptacle."

"Not bad", said my friend. "This proves that something good comes out of CB radio from time to time. I may take it along with me on my next DX-pedition. I understand that the *Thousand Islands* in the gulf of St. Lawrence in Canada have just been made into one thousand separate countries. I think I'll go up there. That will keep me busy working DX for the rest of my life".

I reached into my pocket and withdrew a dollar bill. "Here. Take this", I commanded. "This will pay for my QSL card, just in case I never work you".

73, Bill, W6SAI

KC4NI *(from page 27)*

finally — to our wives and families who tolerated the whole thing, from start to finish. I must conclude with a personal thank you to Rick, W2EPA, who lugged his transceiver over to my rather equipment-barren shack and gave W2FYS a contact with Navassa. Two, actually, a c.w. and a phone QSO. I even have tape recordings of the latter (from both ends, yet!), so I have reasonable proof of a legitimate KC4NI QSO. At that, these are undoutedly the two most expensive QSL's I have ever obtained —about $500 each! Still, it was worth it. Thanks also to K2FT and W2PAU for the photography work . . . nice job, fellas. Finally, thanks to the other five members of the KC4NI gang for providing me with an experience I will never forget! *Where do we go next?* ■

Novice *(from page 55)*

Island, Novice **WM6EL,** has crystals on 7105, 7115, 7125, and 7145 kHz on 40 meters and on 21120, 21135, 21165, and 21189 kHz., according to **Ev Taylor, W6DOR,** of Golden West Crystals, who supplied the crystals. **WM6EL's** address is: **Wm. G. Pekelder, USN Station, Box 38, FPO, San Francisco, CA. 96614.** Another note from Ev to say that **Marilyn Kibler, WM6EC,** the wife of KM6BI, 7200 kHz, s.s.b., is also active on the Novice bands. Ev "got a kick out of" our suggestion to use the dishwasher to clean radio gear. He has been doing it for years. He advises, though, "Do not use it for a plastic chassis typewriter. What a mess!"

In the April, 1976, issue of *The Condenser,* the paper of the LaPorte, Ind., Amateur Radio Club, **Duane Mantick, WN9OMC,** compliments the graduates of the club's latest amateur study course. He then condemns the FCC for even thinking about a no-code v.h.f. license and doubts that there was such a thing as a law-abiding CB operator. But he has a simple, unworkable scheme to prevent these lawless characters from getting into the amateur bands: when they appear at the club's amateur course, refuse to give them the test! We doubt that the depraved characters he is talking about are going to bother to study for any license. But anyone, CB operator or not, who joins a course to study for an amateur license is the person we are looking for . . . **Susan Langley, WN4AKB/5,** 5712 N.W. 112 Street, Oklahoma City, Okla. 73132, earned her Novice license a year ago, when she was 13. Her Dad, **Dave, W4YDY,** appeared in our Novice column, as WN4YDY in the July, 1953, issue of *CQ.* She uses his Collins KWM-2 transceiver in conjunction with a Hy-Gain vertical antenna. Unfortunately, she neglected to mention what bands she works and whom. However, she is in the eighth grade; when she discovered that she could write on any subject for her term paper, she chose "Amateur Radio," which her instructor highly approved of. So do we.

At the bottom of the page already! Remember. This is your column. You are invited to write about your problems, as well as your triumphs in Amateur Radio. You will discover you are not alone. Send your "News And Views," suggestions of subjects we should discuss, and sharp pictures of yourself and station. Address your letters to: Herbert S. Brier, Novice Editor, CQ Magazine, 409 South 14th St. Chesterton, Indiana 46304. 73, Herb, W9EGQ.

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Propagation *(from page 80)*

Western Africa	12-14 (1)	07-08 (1) 08-09 (2) 09-14 (1) 14-15 (2) 15-16 (3) 16-17 (2) 17-19 (1)	21-01 (1)	21-23 (1)
Eastern & Central Africa	*Nil*	12-15 (1) 15-17 (2) 17-18 (1)	20-22 (1) 06-08 (1)	*Nil*
Southern Africa	10-12 (1)	07-09 (1) 12-14 (1) 14-16 (2) 16-18 (1) 22-00 (1)	20-21 (1) 21-22 (2) 22-23 (1)	20-22 (1)
Central & South Asia	17-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 17-19 (1) 19-20 (2) 20-21 (1)	06-08 (1) 18-20 (1)	06-07 (1)
Southeast Asia	16-20 (1)	08-09 (1) 09-11 (2) 11-13 (1) 18-21 (1) 21-23 (2) 23-00 (1)	02-05 (1) 05-07 (2) 07-08 (1)	06-07 (1)
Far East	17-19 (1)	07-08 (1) 08-10 (2) 10-12 (1) 12-14 (2) 14-18 (1) 18-19 (2) 19-21 (3) 21-22 (2) 22-23 (1)	01-02 (1) 02-06 (2) 06-07 (3) 07-08 (1)	03-04 (1) 04-06 (2) 06-07 (1) 04-06 (1)*
South Pacific & New Zealand	16-18 (1)** 12-15 (1) 15-16 (2) 16-18 (3) 18-20 (2) 20-21 (1)	07-08 (1) 08-10 (2) 10-17 (1) 17-19 (2) 19-20 (3) 20-22 (4) 22-23 (3) 23-00 (2) 00-02 (1)	22-23 (1) 23-00 (2) 00-06 (3) 06-07 (2) 07-08 (1)	23-02 (1) 02-06 (2) 06-07 (1) 02-06 (1)*
Australasia	14-17 (1) 17-20 (2) 20-21 (1)	17-19 (1) 19-20 (2) 20-23 (3) 23-01 (2) 01-07 (1) 07-10 (2) 10-13 (1)	00-02 (1) 02-03 (2) 03-05 (3) 05-07 (2) 07-08 (1)	02-04 (1) 04-06 (2) 06-07 (1) 04-06 (1)*
Caribbean, Central America & Northern Countries of South America	11-13 (1)** 13-16 (2)** 16-17 (1)** 08-09 (1) 09-14 (2) 14-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-10 (3) 10-15 (2) 15-16 (3) 16-18 (4) 18-20 (3) 20-22 (2) 22-02 (1)	18-21 (1) 21-22 (2) 22-01 (3) 01-04 (2) 04-07 (1)	20-22 (1) 22-02 (2) 02-05 (1) 23-03 (1)*
Peru, Bolivia, Paraguay, Brazil, Chile, Argentina & Uruguay	12-13 (1)** 13-15 (2)** 15-16 (1)** 08-09 (1) 09-10 (2) 10-12 (1) 12-15 (2) 15-17 (3) 17-18 (2) 18-19 (1)	06-07 (1) 07-10 (2) 10-15 (1) 15-17 (2) 17-19 (4) 19-20 (3) 20-22 (2) 22-00 (1)	20-22 (1) 22-23 (2) 23-01 (3) 01-03 (2) 03-05 (3) 05-06 (2) 06-07 (1)	22-02 (1) 02-04 (2) 04-05 (1) 02-04 (1)*
McMurdo Sound, Antarctica	16-18 (1)	08-10 (1) 17-19 (1) 19-21 (2) 21-23 (3) 23-00 (2) 00-02 (1)	00-03 (1) 03-06 (2) 06-07 (1)	03-06 (1)

Contest Calendar *(from page 78)*

Maryland/D.C. QSO Party

Starts: 2300 GMT Saturday, September 18
Ends: 0100 GMT Monday, September 20

This is the 10th annual party sponsored by the Maydale A.R.S. The same station may be worked on each band and mode for QSO points as well as band multiplier.

Exchange: QSO no., RS(T) and QTH. County for MD/DC, ARRL section or country for others. (Baltimore City and Washington separate)

Scoring: Two points for each QSO. MD/DC use ARRL sections and countries for their multiplier. Others use Maryland counties and Independent cities. (max. of 24 from each band)

Frequencies: On c.w. 75 kHz from low end of each band on even hours. On phone 25 kHz from top of each band on odd hours. Try 10 and 15 on the half hour.

Awards: Certificates to the top scorers in each ARRL section, MD/DC county and each country, both phone and c.w. A minimum score of 1000 for MD/DC and 100 for outside MD/DC required for an award. A Plaque to the Top Scorers, both MD/DC and outside MD/DC section.

Use a separate log sheet for each band and mode as well as a check sheet for each band and mode with over 100 contacts.

A summary sheet showing the scoring, name and address and a signed declaration that all rules and regulations were observed is also requested.

Mailing deadline October 4th to: Maydale A.R.S., c/o C. E. Andersen, W5TWT/3, 14601 Claude Lane, Silver Spring, MD 20904.

Scandinavian Activity Contest

C.W.—Sept. 18-19
Phone—Sept. 25-26
Starts: 1500 GMT Saturday
Ends: 1800 GMT Sunday

It's the world working the Scandinavians on all bands, 3.5 thru 28 MHz in the 18th S.A.C. For the contest the following prefixes will be considered countries. LA/LJ/LG, JW, JX, OH, OH0, OJ0, OX, OY, OZ, SM/SK/SL.

Classes: Single operator and multi-operator, single and multi transmitter. Multi transmitter stations must use separate series of serial numbers for each band. Club stations are classed as multi-operator.

Exchange: Five and six figures, RS(T) plus a progressive QSO number starting with 001.

Scoring: One point for each completed QSO. The multiplier is the sum total of SAC countries worked on each band, as listed above.

Final Score: Total QSO points from all bands multiplied by the sum of the multiplier from each band. (Max. of 10 per band) Scoring is on an all band basis only.

Awards: Certificates for all classes to the two top scores, both phone and c.w., in each country and USA call area.

Phone and c.w. are separate contests. Include a summary sheet showing the scoring and other information, your name and address in Block Letters and a signed declaration that all rules and regulations have been observed.

Mailing deadline is October 15th. This year your logs go to: S.S.A. Contest Manager, SMØDJZ, P.O. Box 3036, S-195 03, Maersta, Sweden.

DX *(from page 76)*

activity from these zones, both c.w. and s.s.b., on 20 meters. Some of the more active stations and reported times and frequencies are as follows:

Zone	Station	Time (GMT)	Frequency (kHz)
18	UA9HD	0054	14025
18	UA9HM	0245	14049
18	UA9OO	0415	14202
18	UK9HAC	0220	14049
18	UK9OAD	0340	14016
18	UA0AAK	0305	14014
18	UA0AU	1248 & 0345	14020
18	UA0BAP	1313	14011
18	UA0BBI	1250	14052
18	UA0DAA	1140	14027
18	UA0KAP	0305	14037
18	UA0KAW	1145	14048
18	UA0OAZ	2345	14219
18	UK0AAB	1235	14205
18	UK0SAJ	1240	14216
18	UK0SAL	0352	14010
18	UW0AJB	0348	14008
19	UA0FCK	0630 & 1154	14033 & 14044
19	UA0QBF	0525	14045
19	UK0IAK	0410	14009
19	UK0ZAD	0550	14020
19	UW0FM	1155	14034
23	UK0YAA	0230	14020
23	JT1AM	1330	14025
23	JT1AO	1425	14048
23	JT1AU	1530	14008
23	JT1BE	1550	14031
34	ST2SA*	0630	14250
34	SU1MA	2000	14275
34	VE1APY/SU	2320	14213
34	LU2DZ/SU	—	15, 20 & 40 meters
34	TF3ST/4U	1900	14270
34	5A3TB	1240	14295

*0630 at 14250 is the Arabian Net time and frequency. Please do not call ST2SA or any other Net station until the Net operation has been concluded.

QSL Information

QSL cards for the following 131 stations *all* go via Joe Arcure, Jr., W3HNK, P.O. Box 14, Norwood, PA 19074.

1. CN8BG
2. CQ6LF
3. CR6KT
4. CR6LF
5. CR7GJ
6. CT1BT
7. CT1FL
8. CT1MZ
9. CT1RM
10. CT1TZ
11. CT1UA
12. CT1UD
13. CT1UE
14. CT1ZW
15. CT2AK
16. CT2JAM
17. CT6UA
18. CT7RM
19. CT7UA
20. CX3BR
21. DA2DX
22. DA2DX/HB
23. DA2DX/HB0
24. DA2DX/LX
25. EA8GZ
26. EA8JJ
27. EL2BI
28. EL2CB
29. EL2X
30. EP2DX
31. EP2KB
32. EQ2DX
33. F0AZC
34. FG0AFC/FS7
35. FY7AX
36. GW3DZJ
37. HC8GI
38. HH2V
39. HH2WF
40. HI8XRG
41. HM1EJ
42. JA1IVV
43. JA6BEE
44. JY9DX
45. KG6JCZ
46. KH6GI
47. KP4DIW
48. KR6HR
49. KV4EN
50. KV4EY
51. LX1BW
52. OD5CS
53. OD5JJ
54. OX5AP
55. OX5AU
56. OY3H
57. OY5NS
58. OY7BD
59. OY7JD
60. OY9LV

61. PA0COE
62. PA0HVM
63. PJ8AR
64. PY1CZL
65. PY1DBE
66. PY1MO
67. PY1PY
68. PY4AKL
69. PZ1CF
70. P29BS
71. SM5BUT
72. SM0CER
73. SP9PT
74. SU1IM
75. SU1MI
76. SV0WC
77. SV0WEE (70-72 only)
78. SV0WUU
79. SV0WXX (71 only)
80. TG8DX
81. TG9DX
82. TI2JCC
83. UA3FF
84. UC2BF
85. UM8FM
86. VE1BFV (Sable Is.)
87. VK9BS
88. VP2ABA
89. VP2EEG
90. VP2EY
91. VP2KK
92. VP2KX
93. VP2LAO
94. VP2VY
95. VP8HA
96. VP8LC
97. VP8OD
98. VS6AI
99. VS6DD
100. WA5VKJ/HB0
101. WA5VKJ/LX
102. XP1AA
103. XW8EO
104. XW8FN
105. XW8GV
106. YA1VKJ
107. YS1GDD
108. YS1GMV
109. YS1JWD
110. YV4CB
111. YV5CEY
112. ZE4JS
113. ZS3CJ
114. ZS3R
115. 4S7DA
116. 4W1GM
117. 4X4RD
118. 4X4UH
119. 5A3TX
120. 5A5TR
121. 5U7AG
122. 5Z4PI
123. 5Z4PP
124. 8P6FU
125. 8P6FV
126. 9C9DX
127. 9J2US
128. 9J2YL
129. 9K2DC
130. 9L1JT
131. 9H4L

NV6ITU—To WA6TAX
VR3AK—c/o KH6AHZ, 179 Aumoe Road, Kailua, Hawaii 96734
VP2MDB—Via K0VVO, 3616 South 101st. St., Omaha, NB 68124
VP5MA—c/o WB4LFM
YB0ABV (W4VN and ex-W0EXD/KC4)—To 11104 Seaglades Drive, Pensacola, FL 32507
ZF1DB—c/o K0VVO, 3616 South 101st St., Omaha, NB 68124
3D6 Bureau—P.O. Box 21, Ezulwini, Swaziland
5B4 Bureau—P.O. Box 1267, Limassol, Cyprus
Need a QSL Manager—Contact Mr. Leo Haijsman, W4KA, 1044 Southeast 43rd. St., Cape Coral, FL 33904
JA0CUV/1—The complete address for this popular QSL Manager is Tack Kumagi, P.O. Box 22, Mitaka, Tokyo 181, Japan

73, John, K4IIF

QRP *(from page 66)*

output. The final version is shown in fig. 1. I was able to get three of the units of different configuration and design to come within approximately 10% of each other, and at that point was satisfied that measurements would be reasonably accurate. Measuring the output of the QRPp transmitter into a shielded dummy load was easy. I then attempted to measure the losses introduced by the various components of the feed system by duplicating the 65ft. length of coax feedline that goes to the quad, and attaching it to the dummy load in order to compare the power delivered by the transmitter directly to the dummy load and the power delivered through the feed system. It was little things like this that took a lot of time. Some interesting figures resulted. Losses were: 0.6dB through the cable, 0.6dB through the coax switch and connectors, and 0.55dB through 2 low pass filters, with total loss factor of about 1.75dB. *If* my measurements were off even 20-25%, my power output to the quad would be either about 1.23w or 0.823W at the 0dB comparative base line. So, at −18dB (during the test), power to the quad would be between 10 and 13 milliwatts, figuring in the possible range of measurement error. (ED. NOTE: WB2OZW does not specify the gain of the quad antenna. Assuming that it is delivering the usual 7dB, the ERP would be about 40 milliwatts at most. Still not very much power going into the ether!)

We decided to begin tests on December 24 by first establishing contact on 14.225kHz s.s.b., and then switching down to 14.005 kHz after determining procedures. At 1540Z, I moved down to 14.005kHz and dropped from 150 watts to 100 milliwatts as planned. We ran the test using the automatic keyer with the letter "H" as described earlier, but had no luck in establishing contact. So we went back up on s.s.b. and talked over the situation.

On December 27, we tried again, but did not use the v.f.o. of the Viking II, because even when it is warmed up, it drifted out of the passband of the 5Hz receiver filter. So I devised a way of driving a modified Hunter Bandit 2000C linear directly from the QRPp transmitter and got enough signal into the air to be heard in Denmark. I felt confident that we'd succeed because I'd worked WA0BWM (MN) with the QRPp transmitter at −21dB on Dec. 6. I dropped out the linear and OZ9FS heard me at 102-07Z, but they were having problems. My frequency counter showed that I was drifting approximately 40Hz per hour on the crystal controlled QRPp rig. I have not yet opened the rig to determine the cause of this excessive drift yet. It should be noted that a sister rig in Denmark was set up on frequency at the same time and its drift rate was only 2Hz compared to the 40Hz I had. At any rate, experimentation was over for the day.

With our experience of past days, we made our usual s.s.b. contact at 1300Z on s.s.b. on December 28. At 1325Z I dropped down to 14.005kHz with only 1 watt and made my call to OZ4LP who came back immediately and told me to QRP −12dB. Then quickly down to −18dB. Then to −21dB. He then requested that I go back to −18dB, satisfied that we had solid copy at that level. I might mention that the whole experiment was conducted with a hand keyer rather than the automatic "H" special unit. Also, the 400Hz passband was used. We had succeeded.

Taking into consideration the losses mentioned earlier, −18dB measured to about 10 milliwatts into the quad. I was quite happy at the contact (like the first time I worked over the pond on 160 meters). The Denmark gang decided to "bend the elbow" a bit while rehashing the experiment. They officially gave me the QRPp test transmitter over the air for my own. Finn wants to do even better, which will require a new transmitter and a new approach to lowering power.

I feel that the Denmark group should be commended for their efforts. As for myself, I was happy to take part in this project—it taught me much, and I have much more to learn about QRPp. It was a worthwhile experience.

News

I'd like to commend the above group on their work. It is the kind of thing that brings great satisfaction to the individual.

Field Day Trophy entries should get to me by August 31, 1976. Although *The Milliwatt* is defunct, I intend to continue issuing the awards for QRPp activities that were introduced by the magazine. Entry should consist of the ARRL Summary sheet, check-off list, power used, whether full portable away from home QTH, whether battery power. Please note my new QTH: 83 Suburban Estates, Vermillion, SD, 57069.

Until next month, 73, Ade K8EEG

Zero Bias *(from page 5)*

by those responding to the survey. The numbers to the right seem to indicate some statistical correlation to a normal distribution curve.

Time of day voice announcement	2.79
1 second tics	1.97
Standard Frequency	1.74
Propagation Forecast	1.40
Maritime Weather	1.35
Geophysical Alerts	.92
Time of day BCD	.67
DUT-1 Values	.28

Although amateurs alone are not the only users of the propagation service it seems rather strange that an item that places fourth in popularity is dropped in favor of items that placed significantly lower on the scale. For those of you who don't use this service or couldn't muster up the interest to send in the survey . . . . well it doesn't matter anyway. Perhaps if even more of you sent in the surveys the results would have been the same.

We are talking about a taking something on the chin, losing a valuable aid, and down grading a service that has been of significant value to our country in the past. The over all cost of this program is about $60,000 per year and less than half of that is directly attributable to amateur useage. That's really nothing compared to some of those heavy research studies the government supports like "The migratory and mating habits

TEN-TEC ULTRAMATIC KEYER

MODEL KR50

- SUPERLATIVE "FEEL" 5-50 GRMS PADDLE FORCE
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- DIT AND DAH MEMORIES WITH SEPARATE DEFEATS
- "STRAIGHT KEY" OVERRIDE FOR QRS OR TUNE-UP
- GUARANTEED FOR LIFE BEARING PIVOTS

A sparkling new keyer with a host of exciting features. A powerful aid to cleaner, more articulate CW that is relaxing to use and a joy to copy.

The paddle assembly will delight the CW purist as well as the recent graduate from a bug or hand key. The superlative "feel" is attained by a magnetic return force, instantly adjustable to exactly the right touch for you.

Weighting, the ratio of dit and dah (bits) lengths to the spacing between them, is either automatically or manually varied. In the automatic position, it is programmed to lengthen the bits at slow speed for enhanced smoothness and decrease them as you advance the speed, for highest articulation. Or, it can be adjusted to a constant value.

The KR50 is versatile. Dit and dah memories are provided for full iambic (squeeze) keying. Either dit or dah, or both, may be turned off for operation as a conventional type keyer. Self-completing characters at all times.

A convenient "Straight key" is built-in for QRS sending or tune-up. Also an internal side-tone and 115VAC/12VDC operation is provided.

The KR50 is designed to have a permanent place in your shack for the years, perhaps decades, ahead. An investment in the enjoyment of CW.

PRICE $110.00

KR20-A
Paddle has unique principle with excellent feel for rhythmic CW. Characters are self-completing. Bit weighting is optimized for normal speeds. Manual key button conveniently located for hand sending. Side tone signal. Reed relay. Plug-in circuit boards. 115VAC or 6 to 14 VDC. HWD 2½" X 4½" X 8¼". Wt. 2½ lbs.
PRICE $67.50

KR1-A
This is the paddle mechanism used in the KR50. Requires 6-14 VDC for adjustable electromagnetic paddle return force. Adjustable contact spacing. For iambic or conventional keyers. "Straight key" button. Housed in an attractive metal case with cream front panel, walnut vinyl top. Size: 2" X 4" X 6", Wt. 1½ lbs.
PRICE $25.00

KR5-A
Similar to the KR20A but without monitor signal and AC power supply. A great value. For 6-14 VDC operation. Size HWD 2" X 4" X 6". Weight: 1½ lbs.
PRICE $38.50

KR2-A
The paddle used in the KR20A. Single paddle for non-iambic keyers. "Straight key" button conveniently located, cream aluminum case with walnut vinyl top. Size: 2" X 4" X 6". Weight: 1½ lb.
PRICE $15.00

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of albino aardvarks" as a ficticious example. We can all point to some of these curious studies and grants elucidated in our newspapers.

Is there a solution? Well we might ask for contributions to keep this going. We could ask the ARRL to subsidize the program. Interested parties could try to get CHU to carry the burden. These are all interesting and possible solutions to a problem that really belongs where it started. Why should we try to solve the problem from without. Why not give the system another shot at cleaning itself up. The U.S. Dept. of Commerce is accountable for its actions and can be made responsive to our needs.

What is needed is the old numbers game. Definitive information is needed as to specific users of WWV information and their ability to pay for it (government and private agencies, private corporations etc.) and general users (THAT'S YOU) who use the service and cannot readily pay for it. What is needed is letters, lots of letters, thousands of letters making the Dept. of Commerce aware of who is using these services and the tremendous benefit derived by amateurs and commercial users alike for this real-time information.

Who do you write to; who do you bombard with letters and cards? The man to write to is:

Dr. Douglas Crombie
Director
ITS/OT
U.S. Department of Commerce
Boulder, CO 80302

Copies of your letters should also be sent to:

Congressman T.E. Wirth
House of Representatives
U.S. Congress
Washington, D.C. 20515

While you're at it send copies to your own Congressmen and Senators seeking their support. They are all obligated to answer and inquire as to your requests.

Ted Cohen, W4UMF has already written to Dr. Crombie stating his views on the matter. We are printing a copy of his letter for you to see. Although the printing is small it's worth the effort to read and to get the gist and style of his letter. Please read it and start to write your own.

The democratic process is just that, a process. What we are facing as amateurs is an erosion into what we have known and enjoyed for many years. Voices louder than ours are being heard and heeded with regard to spectrum space, licensing, and all those intangible and tangible things that have made us amateurs. It is far too late to wait for the specific injustice that befalls you individually to act. By the time it reaches you it is not injustice, but rather justice . . . duly legislated in. H. L. Mencken summed it up beautifully when he said "Injustice is relatively easy to bear; what stings is justice". Do me a favor and do yourself a bigger favor, write Dr. Crombie today.

Philadelphia Roundup

Dick Ross, K2MGA and I attended the Philadelphia Bicentennial Hamfest this past July along with about 100,000 American legionaires. The Ben Franklin hotel looked like the embarkation point for the Normandy Invasion with uniforms and war stories aplenty. Although the attendence was far less than we had anticipated the hamfest pointed out certain things we and the legionaires have in common, even though they turned out obviously in record numbers.

First I would like to comment on the serious illness experienced by the legionaires which at this writing has not been totally explained. It is extremely tragic that this had to befall and mar an otherwise happy event attended by such gregarious and enthusiastic people. One of my concerns was to the many amateurs who did make the hamfest and even closer to Dick and myself. We'd all like the mystery solved and a speedy recovery to those still in the hospital.

On a happier note, while both conventions were in swing, it was very clear that the American Legion was in town. They marched, they met, they convened and if one has the stereotype image of the American Legion Convention with all the noise and hoopla it was fully realized that weekend. This was brought home to us when Friday night came and I went to bed. I got a phone call from

Dick who was up on the ninth floor saying (and laughing) that he had just heard two drum rolls and suddenly a brass band started marching up and down the hall. I could hear them over the phone and they went on and on until the police came.

By Saturday afternoon we realized that it would be impractical for us to stay another day with the attendance being what it was and so we left that evening. It wasn't out of any feelings of anger or inhospitality for those running the hamfest. On the contrary they were more than helpful and worked very hard at making our stay pleasant and enjoyable.

It seemed that the old problems of running a Hamfest in a large city came up and couldn't be solved. It's very expensive to do just about anything in a large city from parking your car to getting something to eat. Hotels, transportation, food, and all other sundry expenses reek havoc with the average budget and limit the attendance potential for the average amateur. What about his family who may want to join him?

The Philadelphia area itself has history to draw upon, a natural tourist attraction in this bicentennial season. Set midway between New York and Washington D.C. there are approximately 40 to 50,000 amateurs residing between both points and within easy driving distance yet only about 700 chose to attend. Why?

Where were the young people . . . the future and immediate present of our pastime? Here is where we start to look at those legionaires and their Convention. They too had very few young people attending. Most that I could see at our hotel were from WWII and the Korean episode in our history. Where is their future membership coming from and where is ours? Is it that they don't exist at the moment or that perhaps they too couldn't afford to go.

Without trying to sound too Freudian, it seems like a very incestious relationship which is breeding from the same gene pool. If like the American Legion we amateurs seem to exist only to relive WWII and the good old days then we sadly shut out all the new and very worthwhile input from the rest of the world. We all cannot afford the time to wait for nature to change or correct herself through some mutation.

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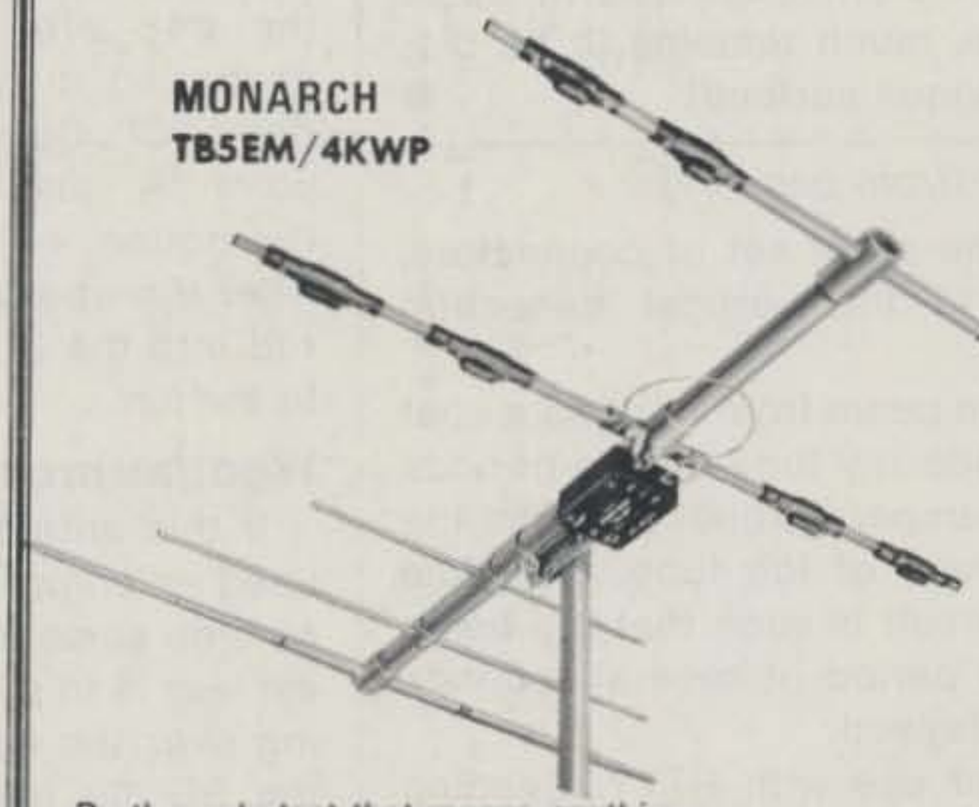

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Hamfests and Conventions should also serve to introduce the new and prospective new to the fold. Perhaps notices could be posted at nearby high schools and colleges welcoming visitors to the event. Newcomers could also mean people of any age, curiousity regarding technical matters. Hamfests and Conventions do show who amateurs are, what they are concerned with, what is the latest equipment on display and the place to get questions answered.

It's not enough to try to reach out to channel some of the interest generated by CBers although this is an ideal place to start. You can start a little bit closer to home. Just think of some of the people who visit you normally and perhaps expressed interest in your antenna or equipment. How many times have you tried to think up an answer to "How far can you talk"? Anyway there are lots of people you come in contact with every day or even several times a month who would make welcome additions to our ranks. All they need is a little spark of interest and some encouragement. Think of all the time and effort people put in you to make you an amateur. Reinvest some of it now.

USA-CA Certificate

Thanks to Hy-Gain and AFS Kriket we were able this month to run a section in CQ in four colors. This gave us an excellent chance to show you the USA-CA Award in color though not in actual size. The actual Award is 21" high by 14" wide and one of the most distinctive Awards given in amateur radio. The complete rules for the Award are on the adjacent page (page 85). The basic Award can be had for confirming contact with 500 countries. At first this may sound astronomical and way beyond reach but if you stop and think about it you probably have close to that number already if you've been active in the last few years. When you get a chance, start sorting out those QSL cards. The certificate is not only the mark of achievement but also a handsome decorative addition to your shack.

Speaking Of Awards

We've had some changes in our DX Department this month first with the

(Continued on page 98)

Relativity *(from page 64)*

force-fields very easily manifest themselves as detectable effects in the "external world".

Having now exposed the tip of the relativity iceberg, it is hoped you will be inspired to explore its mass and investigate its extent with greater thoroughness than can be encompassed in these few *CQ* pages—for sure, much remains to be discovered beneath the tranquil surface! ■

CQ Review: SB-614 *(from page 41)*

fier is looped through the other set of connectors, supplying r.f. directly to the vertical deflection plates.

To prevent the electron beam from burning a spot on the face of the cathode ray tube during periods of no modulation, a clamper circuit deflects the electron beam off the face of the tube. The time delay constant of this circuit is such that the beam is deflected only after a period of several seconds of zero modulation has elapsed.

The Cross mode is for use with RTTY. Feeding the Mark signal from the RTTY convertor to the horizontal amplifier and the Space signal to the vertical amplifier results in a sharp cross pattern that facilitates proper tuning of the receiver to the RTTY signal.

I was tremendously impressed with the sharpness of the trace and the steady display achieved in all operational modes. The SB614 is superior in this respect to earlier Heathkit models and to other makes of monitor scopes currently available.

Construction is easy and can be accomplished in two or three evenings. High quality components, not the least of which is the Hitachi 3RP1A medium persistence cathode ray tube, are used throughout. The finished unit is professional in appearance and performance.

Standing wave ratio up through 54 MHz proved negligible on this unit and others that were sampled.

An elegant touch that does not show in the photograph, is the operational mode displayed in red letters on the black panel above the operating controls.

A monitor scope for the Ham shack should not be looked upon as a luxury, but rather a necessity. Even if you are not a highly technical amateur, you can use the SB614 effectively. By following the simple directions and comparing the numerous display illustrations in the operator's manual with those observed on the scope, you can adjust your transmitting equipment for optimum performance.

The quality, cost savings and fun to be realized in building the SB614 make it a real winner.

Another 5/8 Wave Antenna *(from page 57)*

long. Insert one end of this wire into the hole at "A" and feed it out the bottom. Clean and fold over for 5/8" for eventual soldering into the center pin of the PL-259 plug. Using another short piece of #18 wire, dip this into epoxy cement and use this wire to force the epoxy into the hole. Leave this extra wire in the hole, cutting off any excess. After the epoxy in the bottom hardens, wind ten turns, more or less evenly spaced, and anchor at the tie point "B". From point "B", spiral (no more than one turn) the #18 wire up the fiberglass rod to the top, anchoring it through the hole previously drilled at point "C". Cut off the excess wire. Epoxy the coil at point "A" and "B" and the wire at point "C"; and, the bottom of the rod into the UG-176/U adaptor. After the epoxy hardens, assemble the adaptor and rod into the PL-159 and solder the end of the wire to the pin.

Weatherproofing

If this antenna is installed in the attic it can be used as completed above. If you are going to put it outside some weatherproofing is in order. The easiest way is to put a piecer of ½" heat-shrinkable tubing over the antenna, the coil, and the rear end of the PL-259 plug. Shrinking can be accomplished with a hair dryer. Plastic electrician's tape should be used to cover the entire connector after it is plugged into the SO-239 receptacle. The top of the antenna is made weatherproof by cementing, with the epoxy, a pill bottle upside down, over the end. (Now, don't write to me asking where to get that heat-shrinkable tubing. Contact a local amateur who works in an electronics plant.) If you can't obtain the heat-shrinkable tubing, simply wrap the entire antenna with the plastic tape. Don't forget the pill bottle on top!

Performance

The v.s.w.r. of this 5/8-wave 2-meter antenna is reasonably low, measured at no more than 1.2 to 1 from 146 to 147.5 MHz. At the design simple frequency of 146.94 MHz, the v.s.w.r. was 1.15 to 1. As we mentioned at the beginning of this article, its performance was significantly better than a coaxial antenna upon direct comparison. Build it; you will like it! ■

Two Meter Fishin' Pole *(from page 52)*

antenna, epoxy or sealing compounds (plastic) can be obtained from the local hardware store.

List Of Parts

19.2" steel or brass rod 1/32" to 2/32" (depending on diameter of fiberglass fishing rod). Hollow fiberglass fishing rod blank (one piece-length not important as long as it is over 40" long).

RG-59 coaxial cable (as least as long as the rod blank. Assorted screws, nuts and washers (#6) to mount aluminum tubing.

19" aluminum tubing ¾" or 1" diameter, lucite, plastic or sewing thread spool for mounting aluminum tubing.

#6 solder lug. ■

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TRIPOLE New! 80-6 plus 160 antenna! 80 to 120 feet. Guaranteed. $54.95 kit. Sase for information. Universal Radio Co. Dept C2, Box 26041, El Paso, TX 79926.

SWAP OR SELL - Federal Co. SRT-14 250 Watt Xmtr, for RTTY, Phone, and CW with frequency synthesizer, manual, spare 100kc xtal in oven. Want decent receiver such as Collins, late HRO, or sideband Heath or cash offer. K2YPR (516) IV6-0809.

WYOMING RANCH LAND. Wild horses, antalope, deer, elk. 10 acres $30 down, $30 month. Owner - K6ICS, Mike Gauthier, 9550Q Gallatin, Downey, CA 90240.

RADIO MUSEUM now open. Free admission. 15,000 pieces of equipment from 1850 telegraph instruments to amateur and commercial transmitters of the 1920's. Amateur station W2AN. Write for information. Antique Wireless Assn. Main St., Holcomb, N.Y. 14469.

BUY-SELL-TRADE. Write for free mailer, give name address and call letters complete stock of major brands, new and reconditioned equipment. Call for best deals. We byy Collins Drake, Swan, ETC. SSB & FM. Associated Radio 8012 conser, Overland Park, Kansas 66204. (913) 381-5901.

SELL: SP 600 $150; Gonset Comm III $75; GSB 101 Linear $400; NEMS Clark Rcvr. 50 MHz to 250 MHz $300. Joe Brown, WA6KNK, 1133 Woodman Way, Modesto, CA 95350.

WANTED: Jennings Vac Variable type UCSL or USL - 1000 pf. Coils for SW-3 receiver. L. Dickinson, 633-40th St., Richmond, CA 94805.

---

220 MHz Mixer 30 watts out with P.S. 28 MHz input $95. Clem K8HWW, 33727, Brownlea-Sterling Hts, MI 48077. 1-313-268-2467.

HEATH MP-10 Economy Power Inverter $35. P.P. David B. Blalock, K7KVS, 240, So. 4th Ave., Pocatello, ID 83201.

QST Jan 1952-Dec 1975. $75 or best offer. FOB E.W. Thatcher, K5EC, 3803 Liggett Dr., San Diego, CA 92106.

I would like to get in touch with any Chinese amateurs in U.S. and Canada or elsewhere in world please write, Chuck Nam Lau, VE3-EWW, 266 Maria St., Toronto, Ontario, Canada, M6P1W4.

SELL New commercial 0.1 watt 2m FM transmitter with .34 xtal and mike, No case, $20. W5QNQ, 2025 O'Donnell Las Cruces, N.M. 88001.

SELL: All round emblem KWM2-$925. 516-F2 Spkr. $145.00 CPI Xtal pack $190, MPI-DC Supply $75. Regency Scanner 16 Channel 3 band all Xtals cost over $300, only $165. Call Marty 215-884-6010, WA3IFQ.

WANTED: Heathkit DX-100B Transmitter in good clean condition. Jess Tatum K4IBX, 502 W. Church Street, Kershaw, S.C. 29067.

ANTIQUE Freshman masterpiece radio beautiful. Also, Hallicrafter S-20R, John Hamilton 6050 North Oakley Chicago, IL 60659.

SELL: T4XB without power supply $360.00. Ten-Tec Ant. Tuner $6.00. D. Schwartz, 1183 Southeast St., Amherst, MA 01002 (413-253-5178)

HT-200, unmodified H23DEN-1110A, charger, case and Ni-cad battery, all for $150. WB6FXJ, 714-256-9576 (nights).

FOR SALE: Tubes, 1625 (11), 1624 (1), 1619 (3) 809 (2): 2 mtr. AM converter with pwr. supply, $25.00. Fred Kurz 2711 W. 29th St., Zion, IL 60099.

WANTED: Ant. Rf. mixer and osc. sections of AN/SRR-13 and manual. Mawie Chanco, 655 Del Monte Ave. Quezon City, Philippines.

SELL: Heath Apache TX-1 xmtr. and SB-10 SSB Adapter, $110 plus shipping. G. Kopstein WA9MFZ, 306 Greenwood Ave., Waukegan, IL 60085.

WANTED: Telrex, prop-pitch or Rotobrake rotor, specify condition, price. Contact: Ores-Tes Caballero, WB6OMF 7717 Cotswald Way, Citrus Heights, Ca. 95610.

WANTED: Early Ham receivers for collection. Especially early S or SX models by Hallicrafters. Write L. Hampton, WA5YXA, 407-120 Dallas, Texas 75207.

SWAP QST, CQ, HR, 73. My need/spares list for yours and/or SASE. Want SW-3 coils and Mosley MP-33, TA-33, or TA-33 Jr. for parts. Bob May, WA4DBG, Box 30 Jonesboro, TN 37659.

WANTED: Schematic diagram for Lafayette PB-50 Monitor receiver. John Dyrek RR1 Box 406, Monon IN 47959.

FOR SALE Nation HRO 60, with 7 plug in coils, speaker, mint condition, with manual, $300.00 inspection and pick-up in Florida. Huguenor, 216 W. Jackson Blvd. Suite 612, Chicago, IL 60606.

QSL - DX - QSL - DX - QSL send QSL and DX Cards to: Stephen Kurland, P.O. Box 1822, Glendale, AZ 85301.

NEW Compact Kilowatt, New 12 vdc inverter, P & H Spitfire both for $149.00. Col O. A. Heinlein, W7BIF, 107 Wyoming St., Boulder City, NV 89005.

I-130-A S. Corps VHF signal generator. Need manual. Will buy or exchange with Greek commem. stamps. Geo Kapsokavadis, 23 Kolokotroni St. Kerkyra, Greece.

WANTED: One code wheel. H.A. Sine 717 Densley Dr. Decatur, GA 30033. (404) 636-9305.

FOR SALE: Drake TR4C; RV4C, AC-4, MS-4 Collins 351D2 and 516E1; Heath SB 650 All mint Want SB610. Courtney Judd, K4JYO, RFI Box 195, Uniontown, AL 36786. (205) 627-3580.

QST - 1970 thru 1975 $15 for all six years you pay ship. K4WP, 5326 20 Ave. N. St. Petersburg, FL 33710.

Johnson Thunderbolt Linear needs repair $100., trade for Regency HR-2A, Heath 1B-1101 counter. K6KZT, 2255 Alexander Ave. Los Osos, CA 93402.

WANTED: Broadcasting Yearbooks 1950's. State price. Donnald E. Erickson, 6059 Essex, Riverside, CA 92504. (714) 687-5910.

WANTED: Heath SB-220 2DW amp. in excellent condition. Will pay top dollar. Keith Tate Rt. 3, Kingsport, TN 37664.

WANTED: Maintenance Manual for Collins 51J1. Would pay for copying. Quote price. Clatsop Co. Intermediate Education District, 3194 Marine Drive, Astoria, OR 97103.

THOUSANDS OF CQ (from 1946), QST (from 1950), other mags. Many in exc. condx. also radio equip. and hard to get parts . . . SASE for list. R. Rosen, 420 Riverside Dr. New York, N.Y. 10025.

WANTED: Knight V-107 6&2 M VFO. Coaxial switches & relays with 'N' type connections C. Huth, 1233 1/2 W. State St., Fremont, OH 43420.

TUBES for a KW. 8295/PL-172 $15 each, a pair for $27. Used, in good condx. Dick Kelly W6BKY, Box 1633, Palo Alto, CA 94302.

WANTED: Howard Sams Photofacts after 1965. Don Erickson, 6059 Essex St., Riverside, Ca. 92504. (714) 687-5910.

COLLINS 51Y3 Bird Dog RX, 1 unused, missing mech. Fltr. Firm offer 1st Ltr. All answered. W0IKD, Jeff M. Poston, 801 Colbern St. Belton, Mo. 64012.

WANTED 2 Johnson type "D", 496 pf. R.C. Hopkins, W1GPQ, Hoppy's Haven, Spruce Head, Me. 04859.

ROHN series 25G ten-feet section. Brand new, one available f.o.b. Cleveland, OH Save 25% off normal pricing of tower section. G. Alfred Dodds, P.O. Box 25, Brunswick, OH 44212.

FOR SALE: Filament transformer 110V to 6.3 v.c.t. at 10 amps, $5.00, Raytrack 30 amp. filament choke $4.00, Bud type H-9116 chrome handles $3.50, Raytrack 6 meter plate choke on 3/4" steatite form $2.50, 3 pairs Raytheon circuit board mounting brackets, 1 1/2", 2", 2 1/2", $2.00, 3 Raytheon knobs (2-MS91528-3F2B, 1-MS91528-1F2B) $1.75. A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, N.Y. 11050.

FOR SALE: Vol I, No. I Jan. 1945 CQ Magazine. $15.00. A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington N.Y. 11050.

FOR SALE: Simpson Model 29 4" 0 - 500 v.d.c. meter, 4" National Steatite pillar (X 3/4") screw top, mtg. base, $2.00, A. Dorhoffer, K2EEK, CQ Magazine, 14 Vanderventer Ave., Port Washington, N.Y. 11050.

WANTED: B&W 6100 HT-37- Invader 200 good cond. with manuals, S.J. Stone, W 245, N6250, Sussex WI 53089.

SWAN: 260 built in AC-DC with mic and book like new. $245. H. Tarallo, WB6VNR (213) 346-5871.

MOBILE TR4C 12V power Hustler base and resonator, manual, excellent condx $550. Art Ford 56 Gildare Dr. East Northport, NY 11731.

FOR SALE: Swan Cygnet 300B with SS-16B Slinky Dipole. Used only 40 hours. Best offer Bob Tataronis, 4 1/2 Hawthorne Ave, Methuen, MA 01844.

WANTED: HA-2 6N2 Linear, Transverters for 220, 432 and 1296. Write: W0DYK, Box 11, Otis, CO 80743.

WANTED: Sams Photofacts no. 680 - 1000, R/9, Radio, Radex magazines. Donald, 6059 Essex, Riverside, CA 92504. (714) 687-5910.

FOR SALE: Robot SSTV, 70B Monitor, 80A camera with macro lens, manuals, $550. Mike Ludkiewicz, 143 Richmond Rd., Ludlow, MA 01056.

ICOM 22A with 14 crystals, under dash mount, Larson mobile ant and trunk lid mount, perfect cond. $200. W. Cotter, 817 Westwood Lane, Wilmette, IL 60091.

WANTED: PROP-Pitch motor modified or unmodified, Wilson DB-54, Amplier parts. Any band. Dale Hammer, Colonial Crest Apt. 222, Muncie, IN 47304.

NEED manual or signal Corps I-130-A VHF signal generator. Will buy or exchange with current Greek philatelic material. G. Kapsokavadis, 23 Kolokotroni St. Kerkyra, Greece.

MAGAZINES FOR SALE: CQ/73/QST/Ham Radio, issues at 20 cents each including USA shipping) from Lickheed Ham Club, 2814 Empire, Burbank, CA 91504. Send list and check. Available issues and any refund due will be sent promptly.

Did you know that supplements to the book, "CQ YL" are available? They bring the book up to date with YLRL Officers through 1973 and the 6th YLRL Convention, held at Long Beach in May '72. If you have a copy of "CQ YL" and would like to add the new supplements (the pages are "slotted" so they fit directly into the "CQ YL" spiral backbone), drop a note with your request to author/publisher W5RZJ, Louisa Sando, 4417-11th St., NW, Albuquerque, NM 87107. Please enclose two thirteen cent stamps to cover cost of mailing. The one and inly book about YLs in ham radio, "CQ YL" contains 21 chapters, over 600 photographs. Order your autographed copy or a gift copy from W5RZJ, $3.00 postpaid.

SELL: 4-1000 A used, $30. 1,000 pf loading cap. $7. Raytrack kw plate tank coil for 80 & 40 plus kw bandswitch $16. UTC S-506 kv c.t. 300 ma, new pick-up only, $75. 7200 v.c.t. 1a. 115/230 v. pri. $35. Pick-up only. OZ-PAKS: Large (several kw) $30; small (2 kw) $20. R. Ross, 95 Norwood Ave., Northport, NY 11768.

WANTED ANTIQUE GLASS - Looking for old milkglass, purple slag, carmel and greentown too. Tell me what you have - I pay the highest prices. Write Jack Schneider c/o Cowan Publishing, 14 Vanderventer Ave., Port Washington, LI, N.Y. 11050.

LOOKING FOR old Lionel trains. Interested only in "O" gauge, excellent to like-new condition. Primary interest is locomotives prior to 1952, but will consider complete sets or more recent models. Am willing to buy outright for cash or swap radio gear to meet your needs. Write Dick Cowan, WA2LRO, c/o CQ Magazine, or call 516/883-6200.

TS-520 with CW filter-Brand new $600. 75S1, 32S1 516F2 Mint $750. F.P. Heinemann, W1YG, Brockway Landing, Lyme, CT, 06475

NEED/WANTED: Specs., Schematic diagrams for "Trio" model 6R4S Receiver. Andre Perreault, P.O. Box 192, Kenogami, Quebec G7X-7X7 Canada.

PLEASE don't throw away your old call books, please mail them to me, I'll remail them to Eastern Europe where they are wanted. Joseph Bryda, 60 Orchard St. Springfield, MA 01107.

SILTRONIC - 1011-C $435.00. Siltronix - 1011-B - $400.00. Hammarlund HQ110C $110.00. James C. Crabtree, Rt 1 Box 191, Minford, OH 45653.

SELL: Heath F.M tuner, Model FM-3A, plus amplifier and speaker, mint condition. Bargain. $15.00. B. Nastoff, 320 W. 56th Place Merrillville, IN 46410.

FOR SALE: TCS 13 Xmtr., receiver, loading coil and remote control, needs power supply $50. Brian Swanick, 609 McKinley, Mundelein IL 60060.

FOR SALE: R-390A excellent condition $350. SPR-4 excellent condition w/17 xtra crystals noise blanker and manual $375. Howard Gross, 1355 E. 18th St., Brooklyn, N.Y. 11230.

WANTED: HRO receivers (any condition). Broken SB-34, Millen Transmatch, Yaesu SP-401 speaker to match FTDX-560. WA8MLV, 1008 Englewood Dr., Parma, OH 44134.

VIBROPLEX BUG. Orig deluxe chrome w/black base and case. $28.00. Want Yaesu 101-E, TS 520, SBE 34, 35, 36. John Hamilton, WB9OEQ, 6050 North Oakley Chicago, IL 60659.

FERRITE BEADS: Lowest price in the country. 15 for $1.00. with spec. sheets on orders under $5.00. Please add .25 cents for handling and postage. T. Gorlin, 4829 Buchanan St., Hollywood, FL 33021.

R-390 Receiver Owners — Now available. Government Surplus MX-2840/URR. Audio Frequency Detector. Used to convert the I.F. output to an audio output. Connects to I.F. output, J-116, of R-390. Brand new original carton contains: MX-2840/URR, connecting cables, power cable, technical manuals, spare parts kit, 110-125 VAC power supply. $29.95 prepaid. Colonel Wayne D. Russell, 9410 Walhampton, Louisville, KY 40222.

REGENCY HR-2B new in box $195., or trade for HR-440, Heathkit Mod AF-1 Audio Frequency Meter $20. K6KZT 2255 Alexander Ave. Los Osos, Ca. 93402.

SELL: Heath SB-303 SB-401, SB620, SB-600 All cables and manuals, best offer, P. Feely, 15 Locust Hill, Yonkers, N.Y. 10701.

SALE: Swan 250 C-6mtr SSB Transceiver - 230 XC - power supply - 14 C power supply, new condition will ship in orig. cartons $450. W.J. Zaveczky, WA2SUY, 5105 Mineola Rd. College Park, Md. 20740.

ATV xcvr T44 on $439.25 w/preamp and xstr camera. Make offer. WB2OZA, 716 Calhoun Ave. Bronx, N.Y. 10465.

"BUG" KEYS for collector have five to sell. Want SBE 34, 35 or 36. John P. Hamilton, WB9OEQ, 6050 North Oakley Ave. Chicago IL 60659.

WANTED: 300 Ohm Twinlead transmitting type Amphenol 14-022 with solid wire W6RW (213) 654-3714.

WANTED 75 Ohm Twinlead Transmitting type Amphenol 14-023 No Junk. W6RW, Robert Mace, 8600 Skyline Dr. Los Angeles, Ca. 90046.

HEATH DX-60 with HG-10, $95; Ameco 2-mtr. conv. $30; Fred Kurz 2711 W. 29th St. Zion, IL 60099.

SELL or TRADE: 60 w AM/CW 6M TX, Pair 6146s for CB rig or LW rcvr. William Smith, Brown Terrace, Uxbridge, Ma. 01569.

R-392 with manual and power transformer $159. F.O.B. Mike Bae, Box 95, South Branch, NJ 08881.

FOR SALE: Railway timetables 35 different R/Rs year 1882 all originals. G. Saunders, RR RR 3 Barrie Ont. Canada, L4M 4S5

SALE: ROBOT monitor, camera, fast lens $450. HW-32A Xceiver $85. IO-102 scope $90 RF gen. $35.00, All like new WB2AQC, George Pataki, 34-24 76th Street, Jackson Heights, N.Y. 11372.

WANTED: Power tool for Collins 637B L.P. Antenna. VFO for EICO 753 Transceiver, Wayne Braey, 57 West Main St., Chateaugay, N.Y. 12920

SIERRA VISTA, Arizona, Second Annual Cochise Amateur Radio Round-up. September 11, 1976. Information Box 1855, Sierra Vista, AZ 85635.

40 Meter Kirk 3 Element Beam Brand new in original carton $450. F.P. Heinemann, Brockway, Lyme, CT 06371.

FOR SALE: Heath HX-10 Marauder, $160.00 good condition Pick-up only. Ph. 912-923-4492.

TR4C W/Noise blanker. MS4 AC4, Fan, Manual. Clean little use $575. Art Ford, 56 Gildare Dr., East Northport, N.Y. 11731.

SELL: Bronica S2A complete outfit, absolutely mint condx. $600. AC5RIQ, 4908 Broken Bow Pass, Austin, TX 78745.

TELETYPE MACHINES, Models 28, 19 and 15's $25-up. (312-752-1000) Goodman, 5454 South Shore Dr. Chicago, IL 60615.

PROPAGATION PREDICTIONS made easy! New, proven development of a do-it-yourself DX forecaster tailored to your location and your equipment. For information send large SASE. Research Associates, Box 13237, Gainsville, FL 32604.

FOR SALE: DX-100 BC-312 with speaker and power supply R.C. Phillips Rte 3 Box 327 Jefferson OH 44047.

NEED instruction book with schematic or clear photostat of same, for Knight Star Roamer II. T.C. Streeper, 5265 Madison Rd. Madison, OH 44057.

SB-303 Rcvr. $350 or trade etc. WANTED: Atlas 210 Etc Brick - 2M Wanted. Foy Coble, 251 Collier Ave. Nashville, TN 37211.

HEATH IB-102 Ffeq. Scaler. Need for Heath Counter. Will pay top price for unit in good condition. F. David Fuller, Rt. 2, Box 73, Pine Apple, AL 36768.

ELECTRO-VOICE model 664 professional dynamic mikes, low or high impedance, new and boxed. Two for $84, postpaid in US 48 states. G. Alfred Dodds, P.O. Box 25, Brunswick, OH 44212.

WANTED: Atwater Kent Breadboard parts, DeForest parts, Brass Binding posts no. 14 Wm B, Duck Catalogue. Glen Angle K0TAM, Clear Lake, SD 57226.

WANTED: Millen 90932 monitor scope, Heath 1B-1101 or SM-110A counter, heath weather station. W. Davis, 2255 Alexander Ave. Los Osos, Ca. 93402.

SELL: T4XB, excellent condition $365 without power supply. D. Schwartz, 1183 Southeast St. Amherst, MA 01002. (413)253-5178.

WANTED: Manual and wiring diagram for surplus 40 meter transceiver. RCA. BC474A, and a reasonably priced SB 200 linear. Nick Wyers, 6570 Springside, Downers Grove IL 60515.

SALE: Johnson Ranger II w/Dow Key Relay $110.00. Devin Pagan, WN5QOR, 1909 S. Colberhouse, Jonesboro, AR 72401.

URGENT: I need QSL and DX cards - send QSL and DX cards to Steven Kurland, P.O. Box 1822, Glendale, AZ 85301.

SELL OR TRADE: Heath HM-102 SWR meter. H. Greenfield, 9501 Lorel, Skokie IL 60076.

SWAP: Old Radio Programs on tape. for info write: Tape Trade, 1705 Kaywin Ave., Bethlehem, PA 18018.

FOR SALE: Dentron Super-Tuner less than 1 year old - mint condx. $100.00. Dan Veseth, P.O. Box 277, Escanaba, MI 49829.

COLLINS mechanical filter, F455FA-21, used in 75-3B/3C, 32S-3. $25. L. Berman, 1020 Laguna Ave. Burlingame CA 94010.

WANTED: Trylon Rotor in any condition - also want Triex Tower and T5A4 Receiver. F. P. Heinemann, Brockway Landing, Lyme, CT 06371.

NEED: Manual and knob for BFO pitch control - NC105. R.W. Randall, K6ARE, 1263 Lakehurst Rd. Livermore, CA 94550.

HEATH: GR-78 Receiver $65.00. J.P. Johnson 135 W. 9th St. Jacksonville, FL 32206.

WANTED: Instruction Manual and cabling diagram for "Morrow MB-560" mobile transmitter. G.W. Chittenpen, 3408 S. Parnell, Chicago, IL 60616.

SWAP: Three vhf ARC-5 xmtrs, 50, 144, 220 mhz. w/pwr supply-modulator for what-have-you? R. Voelker, WA2PCL, 101-23 Lefferts Blvd. Richmond Hill, NY 11419.

SALE: Celstron 8 telescope and assorted lens. Case, mount etc, $850 or best offer. WAS LIQ T.L. Bruce, P.O. Box 697, Tinker AFB, OK 73145.

HEATH-SB-303, $260, SB-401, $240, SB-620 $110, All manuals cables mint cond. P. Feely 15 Locust Hill, Yonkers, N.Y. 10701.

NO DX QSLs? Try ham sentences in 54 languages on your card. It works! K3CHP's DX QSL Guide, $395. Joe Mikuckis, 6913 Furman Pkwy. Riverdale, MD 20840.

TRADE: Cassete. New Amos n' Andy, Hindenberg disaster. Mr. DA and Love Mystery. What have you? R. Don Stinnette 3554 Utah St. Eureka, CA 95501.

SELL: FR DX 400 160 - 2 meters, all filters. Swan 600-T, FR 101S Rcvr. Highest bidder. A.C. Zanoni, W1VM, RFD 1 Box A-9, Saunderstown R.I. 02874.

SELL: Heath SB-610 $90, Hammarlund HC-10 $45, VHF 126 Converter $30, Heath Two'er $10, all mint! Plate Xfmr 3600-0-3600 at 1 amp with 110/220 primary $40 fob. W0AIH, Paul Bittner, 304 W. 17th, Grand Island, NE 68801.

FOR SALE: QST/73/CQ. SASE for list. E. Guimares Jr., RFD 2 Box 480, Middleboro, MA 02346.

NEW Instructograph -76 model - 500 - 15 tapes phones and key $70. You Ship. George F. Stickney, Rt. 4 Box 531, Laconia, NH 03246.

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WANTED: schematic for CCA Electronics VHF-500 Xmtr. W. Mallenhauer, WA2FFZ, Box 3 S. Main St. Glassboro, N.J. 08028.

WANTED: Riders Radio Volume 23; any Riders TV. Don, 6059 Essex, Riverside, CA 92504. (714) 687-5910 days.

HEATH HW-101, HP-23B AC Power Supply, Spare Finals, 2 Microphones and Speed Key. Mint Condx. Complete with all manuals and cables. $325.00 or consider trade for 2 meter gear. John Sroka, WB7BQO, 6006 W. Laurie Ln. no. 4 Glendale, AZ 85309.

LINEAR BUILDERS Send SASE for list of goodies, parts. MACE 8600 Skyline Dr., Hollywood, CA 90046.

WANTED old Morkum distributor for use with Western Union 1A tape heads. Also Sylvania type 1D21 Photostrobe tubes. W. LeTourneau, WB0CTE, 2338, E. South Ave., No. St. Paul, MN 55109.

LAMPKIN 205A FM Modulation Meter, late 4-scale model, all FM Bands, $150. Shack cleanup, 4CX250B 432 MHz etc, SASE, list. C.E. Spitz, W4API, Box 4095, Arlington, VA 22204.

WANTED: 312B5 and 312B4, sell accu keyer with paddles $65, Call Marty 215-884-6010, WA3IFQ.

WANTED: HW-101 in excellent condition. State price or parts, components, meters. etc. for which will trade. Geo. W. Smith Jr., W5HIP, Route 1 Box 137, Pottsboro, Tx. 75076.

FOR SALE: Hallicrafter R-46 Speaker $8.00, Eico VTVM Model 232 $15.00, ARC5 Transmitter 5.3-7 mc. $8.50, Link Transceiver, 50 mc $10.00. Hallicrafter 12 VDC Supply Model MT-2 $15.00. Surplus 2 meter transceiver $10.00. Waters 2 pos. coax switch, model 341 $4.00, Eico FM tuner & manual $10.00. Code training set with 9 brass keys and earphones. T. Coddington, WB6AWC, 7825 Scotts Valley Rd. Lakeport, Ca. 95453.

SELL: HT-40 xmtr. $40.00, Clegg 99cr $35.00, Sig. Gen. $25.00 Audio Gen Boonton 71 $30.00 U Ship, WB9IXY, R6 Box 30, New Castle, Ind. 47362.

WANTED: Heath IM 2202. Hammarlund HQ-160. QRP Transmitter. K9UKX, 51625 Chestnut Rd. Granger Indiana, 46530.

STOLEN: Regency HR-2 SN04-04279 SSN 313-40-1690 engraved on inside frame $50 reward. Bob Walker, W4LPU, 4713 N.W. 3rd Ct., Plantation, Fl., 33317. (305) 792-7015.

WANTED MFJ-101D Timer. Will pay $30 if mint condition. Woodbury, Meadowbrook Rd., Dover MA 02030.

FOR SALE: Three Hallicrafter S-27 AM/FM receivers, need some work. Chicago area only, $25 each if you pick up. W9FOC, 1616 Campbell St., Joliet, IL 60435.

LAMPKIN 205A FM Deviation modulation meter, late 4-scale model, $150 w/manual. SASE list Shack Cleanup, W4API, Box 4095, Arlington, VA 22204.

FOR SALE: Hallicrafter Sx28 super SRv rider rec and spk. 42-.55 MC. Colec. item. Echo phone Rec. AC-DC 30 MC - .55 MC Needs BFO work. With manuals. James Blair, 4323 Bronx Blvd. Bronx, N.Y. 10466. (212) FA4-2569.

FOR SALE: Drake 2C rcvr w/Q-mult, blanker calibr, $250. SB-34 xcvr w/mike, calibr, mobile mount, $250. Heath HX-10 xmtr, $150. All excellent. FOB W7CSJ. Dennis Jackson, 3785 LaMont Rd., Meridian, ID 83642. (208) 888-7176.

WANTED: Large Hvy. duty, oil filled filter caps. State uf, volts, dem., price. P.O. Box 186, Greenville, S.C. 29602.

COMPLETE UNIT - GT550 RV550 RF550 USC550. Total price $400 perfect cond. Harry Steffan, W8RHZ, 9718 Liberty Rd. Twinsburg, OH 44087.

WANTED - ARRL Handbooks. Callbooks, and radio magazines. Don Erickson, 6059 Essex St., Riverside, CA 92504. (714) 687-5910.

UNSCRAMBLE POLICE CODE with decoders. Works on all scanners and receivers. For prices and brochure, write: Don Nobles, Route 7, Box 265B, Hot Springs, Ark. 71901. (501)623-6027. (Dealers Wanted)

MEDICAL: Any licensed amateur radio operator in the medical or paramedical field should join MARCO (Medical Radio Council). Contact: Stan Carp, M.D. K1EEG, 44 Main St. Saugus, MA 01906. (617)233-1234.

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SELL HRO-60 with 4 coils $130. HQ215 for $215. You pay shipping. J. L. Torzewski, K9UKX, 51625 Chestnut Rd. Granger IN 46530.

WANT: Swan 270B and 20A Exciter. H.R. Combs, 6 N. Pleasant, Grant City, MO 64456.

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Zero Bias *(from page 93)*

resignation of Hugh Cassidy, WA6AUD, as Assistant DX Editor and Manager of the WPX and DX Awards Program. Hugh is leaving to devote more time to his own DX publication, *The West Coast DX Bulletin*. Hugh and his XYL are Editor, Publisher and Pressmen and do just about everything to put it out. We are sorry to lose Hugh's services but as long as it's in the cause of DX we will understand.

Joining us as Assistant DX Editor will be Rod Linkous, W7YBX. Rod hails from Seattle, Washington and was founder of the Western Washington DX Club. He was President and Editor of the club bulletin for many years and is still very active. Rod will also handle the CQ C.W. and S.S.B. DX Awards. Look for Rod's first DX Column in the January issue.

The CQ WPX Awards will now be administered by Bob Huntington, W6TCQ, of Torrance, California. Bob is an active WPXer and at present is semi-retired so we assume he is ready to be deluged with WPX applications.

We anticipate a smooth transition and would appreciate giving Rod and Bob a little time to get settled in their new jobs before hitting them with any serious problems.

Speaking of DX and Awards, I would like to add my congradulations to *CQ*'s venerate Contest Editor, Frank Anzalone, W1WY. Frank first joined the *CQ* staff and was listed on our masthead with the August 1956 issue and with this issue marks his twentieth anniversary with *CQ*. It is doubly noted that also in this anniversary issue Frank's election to the DX Hall of Fame is announced. Frank has been *CQ*'s personal curmudgeon and over the years I have taken delight in some good natured teasing of Frank in the April issues of *CQ*. He has supplied the moral and ethical leadership for our Contest program and delivered selfless energy in the cause of amateur radio and *CQ*. I don't want this to sound too much like a eulogy or really praise Frank too much since I expect him to keep working for at least another twenty years and not to get a swelled head and ask for a raise. Suffice it to say that all of us at *CQ* are very proud of our *compare*.

73, Alan, K2EEK

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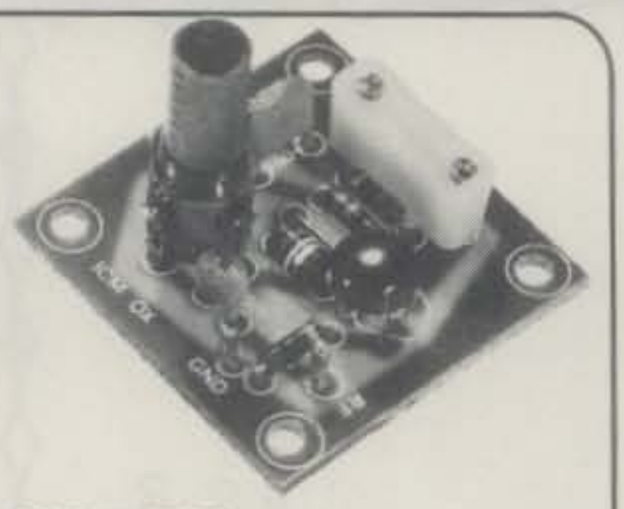

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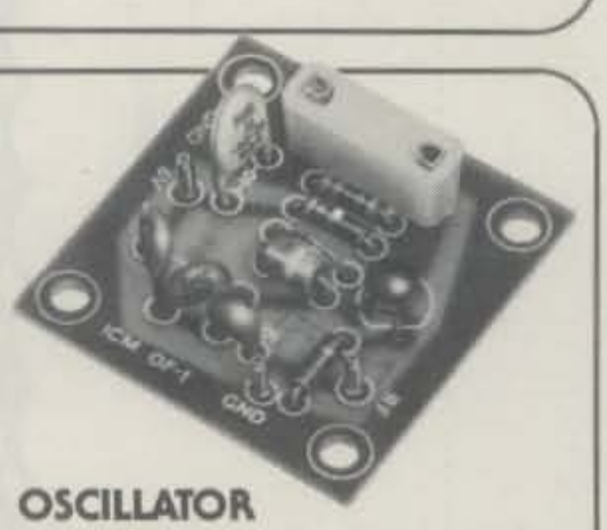

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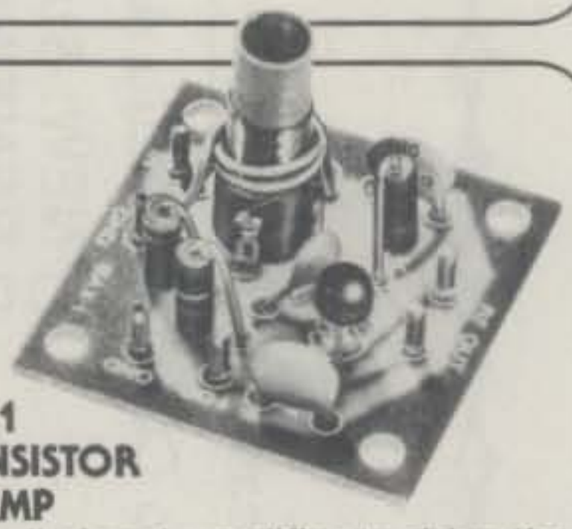

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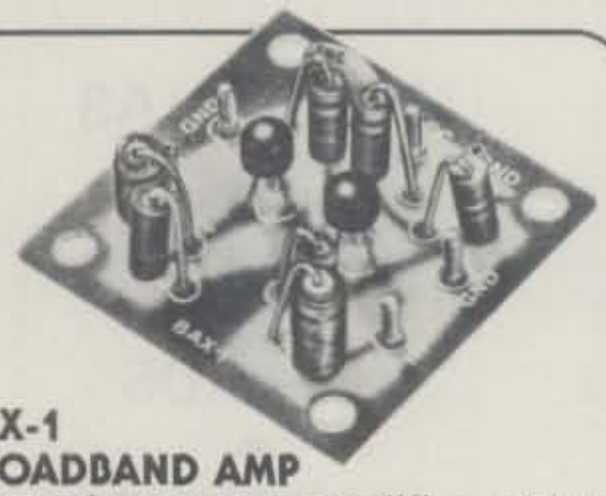

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